The Builder.

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Odds and Ends.

BEFORE settling the date for an entertainment, it would seem easy for a public body to learn what other bodies were doing in that direction, and so to avoid clashings. Whether easy or otherwise, this is not done. On Thursday night in last week the Royal Academy and the Royal Horticultural Society opened their doors to guests, the dinner for the Artists' Benevolent Fund then also taking place, and, as a matter of course, with reduced numbers; and on Thursday night in this week the Society of Arts and the Royal Institute of British Architects both held a *conversazione*, the former in the South Kensington Museum—a mighty crowd—and the latter at the House in Conduit-street. We note the occurrence in hope of preventing similar conflicts in another year. The Academy *soirée*, held earlier in the season than usual, with London full and new galleries to attract, was the most brilliant they have ever had. Music lent its aid, and the dresses of the ladies took the colour out of the pictures. This was also done by the gas, which seemed, so far as the paintings were concerned, to be a little in excess. Mr. Smirke's galleries, however, came out admirably, and the varied decoration was more observable, or at any rate more observed, than had hitherto been the case. The public will soon pay for the new building. We have heard, on tolerably good authority, that the "takings" at the door during the first month exceeded those of last year by 800*l.* a week; and that if the attendance continue to be as it has been, the total receipts for the season will probably be little less than 20,000*l.* We hear, too, that there will be no evening exhibition at a "reduced" charge, as heretofore; and hope, if this be true, that the Academy will compensate the less fortunate part of the public by reducing the entrance-fee, say for the last week. If they were to open the Exhibition *free* for a short time, it would increase their popularity.

Prince Teck at the Horticultural Society would have pleased the members better if, following the example of the Duke of Buccleuch on a similar occasion, he had personally received each visitor: the character of a "reception" is quite changed when visitors are not received.

At the Artists' dinner Dr. W. H. Russell discharged well the duties of chairman, and nearly 800*l.*, including a recent bequest, were the result. A wonderful career has been that of William Howard Russell, the "pen of the war," and very much his countrymen owe him. The Crimea, India, America, Russia, Egypt, have been scenes of his labour, and, as a writer under difficulties, he may claim amongst his characteristics wonderful truthfulness as well as brilliancy. In drinking "Prosperity to the Artists' Benevolent Fund," he said that in asking their continued support to the institution he was not soliciting aid for a struggling fund in its infancy, but for a veteran of green old age, with, he hoped, the prospect of a long and active existence. It was solely in that conviction that he addressed them. The fund was not in the process of organisation,—a word which he confessed he had a horror of,—he was simply anxious to promote a system of recruiting, and thus ensure a continuance of that support which so useful an institution required and demanded. The fund was in a flourishing condition, but that condition might fall into a state of decay unless the same active powers now in operation were employed to maintain it. If his humble words could reach the world outside the room, and if he could successfully appeal to the sympathies of those whose walls were hung with the works of artists, he was quite sure he should be enabled to do something towards increasing the benefits of the fund. All the institution wanted was fuel to put into the boiler to enable it to go on as it had done.

This fuel must not be withheld. The fund specially helps those who help themselves. Every young artist should obtain an interest in the Annuity Fund. Only one R.A. was present on the occasion of which we are speaking, namely, Mr. O'Neill; partly because of the *conversazione* already referred to, and partly perhaps because of their attendance not long ago at the dinner for the Artists' *General* Benevolent Institution, an excellent society, but one that does not render the Artists' Fund unnecessary; in fact, as Mr. C. J. Dimond, the honorary secretary of the latter, said, if the Annuity Fund were rightly taken advantage of there would be little necessity for the General Benevolent Fund. The dinner was not well reported. It is an odd fact, by the way, that newspaper reporters of dinners, by whom half the speakers may not be mentioned, state, nine times out of ten, that Mr. This or Mr. That "was the toast-master;" though the doings of the majority of these officials, who request the company to "drink the harmy with all the onnors," are scarcely bearable.

Amongst other recent meetings we would mention that of the Society for Improving the Condition of the Working Classes, which was held on Friday in last week, the Hon. W. Cowper presiding, and the Rev. J. B. Owen, the Rev. A. W. Thorold, and several others, speaking earnestly in its favour. Mr. C. Payne, the active secretary, in the course of his report gave an epitome of the balance-sheet, thus:—Received from all sources in the year, 5,659*l.* 15*s.* 4*d.*; to which add balance in hand, 516*l.* 12*s.* 2*d.*; total, 6,176*l.* 7*s.* 6*d.* The current expenses of all the lodging-houses, including repairs, amount to 3,504*l.* 2*s.* 11½*d.*; the interest on loans, &c., 898*l.* 5*s.* 9*d.*; printing publications, and lithography, 107*l.* 1*s.* 1*d.*; salaries, agency, rent of offices, advertisements, and all incidentals, 852*l.* 2*s.* 4½*d.*; leaving to the credit of the society, 814*l.* 15*s.* 4*d.*; total, 6,176*l.* 7*s.* 6*d.* The real property, &c., belonging to the society (at cost), including balance at banker's, for the year ending December 31st, 1868, is 44,973*l.* 5*s.* 9*d.*; general liabilities, 20,987*l.* 3*s.* 3*d.*; leaving assets, 23,986*l.* 2*s.* 6*d.*

Some little regret was expressed by one speaker, and we think with justice, that, considering the large amount expended, the net profits of the year were so small. Mr. Owen had said in his speech, with respect to the rate of mortality in the houses of the society, it might be remarked that for the last ten years there had been a steady decrease in the average per 1,000. In 1859 the average was 20 per 1,000. In the year following it fell to 19 per 1,000. For the next five years it kept steadily to 16 per 1,000. In 1866, in consequence of an epidemic, it went back to 19 per 1,000. In 1867 it fell to 15 per 1,000, and from the causes stated in the report, clearly of a temporary and exceptional character, it had risen last year to 22 per 1,000. As the pioneers in this work they had to make and clear the way, and thus had to encounter greater difficulties than those who followed in the same course. The Limited Liability Act, which had been passed since the society commenced, had greatly facilitated the promotion of other companies for building improved dwellings for the working classes. They were delighted to see the spread and the success of these bodies, because they looked upon themselves as the parent society, and upon the others as their legitimate progeny. There was, however, and would continue, this difference between them, namely, that this society was in the main based on philanthropic principles, and a pecuniary dividend was a secondary consideration; while the others very properly based their operations on the commercial principle, and looked for a fair return upon the capital invested.

Fully admitting the position of the Society as a pioneer, we should be glad to see it returning a better percentage on the money spent, so that other bodies might find it their interest to invest in a similar direction. The chairman, in his closing address, said the society might undoubtedly have shown a larger balance in their favour, but that must have been done by charging higher rents, and this was not their object. It was, however, gratifying to know that in some cases a good, steady dividend of 4 per cent. had been realised by some of the companies; and if by the use of concrete walls or the Portland cement walls lately introduced the cost of cottages could be reduced from 130*l.* to 80*l.* and lower, they might hope not only to multiply these dwellings, but to reach a lower stratum of society. They might all be thankful that so far they had been engaged in a good work, and had achieved some success. The utility of the society was not confined to the buildings it had erected or modified and improved. It was in constant communication with persons on the Continent, and even in America, who sought advice, assistance, and plans, and in this special direction it was of very great service, and he thought they might look back with satisfaction on the past, and with hope to the future.

This is perfectly true, and ought to be taken fully into account when scanning the financial results. We may make another opportunity, however, to discuss this matter more fully.

At the dinner, a few weeks ago, of the Artists' General Benevolent Society, to which we alluded just now, the conductor of this journal ventured to call somewhat urgently for a reinstitution of the British Institution, or, at any rate, for the re-establishment of the annual exhibition of the works of the old masters, formerly held under its auspices, and thought that its capital—some 14,000*l.* or 15,000*l.*—ought not to be lost to art. The remarks found ready acceptance, and have since brought us a number of letters asking what should be done in order to secure the exhibition in question. It may be as well, therefore, that we should say, the Burlington Fine Arts Club, at present a small though influential association, are again moving with a view to bring this about. It appears that this club was founded to bring together on a friendly footing collectors, amateurs, and persons variously interested in matters of art, and to provide a centre for the exhibition and comparison, among its members, of objects of interest in their possession. Secondly, to utilise these exhibitions by making them, from time to time, subservient to the illustration of particular arts, or the art of a particular master or period, and to render them, under certain restrictions, accessible to a portion of the public. Thirdly, and especially, to identify the action of the club with the action, about to cease, of the British Institution, with a view to the revival and maintenance of periodical exhi-

bitions in London of works of art by the great masters. With these objects the club opened in temporary premises, 177, Piccadilly, on the 1st of January, 1867, and has held there such special exhibitions as a limited space and light permitted; free access to these exhibitions being given to artists, men of letters, and other persons known to take a legitimate interest in art. It was soon found, however, that better accommodation was needed, and a sub-committee recommended the following as a course proper to be adopted, viz.:—

"To bring before the special general meeting, announced for the third Tuesday in May next, the desirability of extending the club to 500 members, either as a regular Dining Club (plus a certain art action), at 8*l.* 8s. per annum subscription; or as an Art Club (minus dining accommodation), at 5*l.* 5s. per annual subscription, as the meeting should, after discussion, determine. One or other of these propositions having been carried, the sub-committee consider that invitations should forthwith be addressed to persons likely to prove eligible members of the club, setting forth a definite scheme, and undertaking that if, in reply to such invitations, the committee should receive before Michaelmas next assurances that a sufficient number of additional members would join the club as from the 1st day of January, 1870, then the committee would engage suitable premises into which they would remove from their present house, so that the new premises might be occupied, and the business of the extended club commence, as from the 1st day of January, 1870, from which date subscriptions of new members should run."

Touching the British Institution, and a continuance of the Exhibitions of Works by the Old Masters, a conference was held, whereat it was understood to be agreed that the directors of the British Institution would advance their capital of 14,500*l.* or 15,000*l.*, free of interest, on a substantial security that the money would be laid out by the club in prosecuting the objects for which the British Institution had been incorporated; and endeavours were at once made to obtain a site available for the double purposes of an extended club and a gallery. It would appear, however, that no site suitable to the double purpose in view has as yet presented itself.

The club, we are told, has recently determined to adopt the recommendation to extend the number of members to 500, on the basis of its present constitution as an Art Club; and that for the purpose of providing adequate accommodation for the club so extended, and for affording increased facilities for carrying out the special art objects of the club, the committee are to hire on lease or otherwise such premises as they may deem eligible. Further, they are to communicate the proceedings to the council of the Royal Academy of Arts, and to the directors of the British Institution, and to suggest a conference of the three bodies, with a view to the settlement of the question, viz.:—"Is it desirable that Annual Exhibitions of Works of Art by Old Masters should be held in London; and if so, does it appear that by the action, collective or separate, of the three bodies above-named, this desideratum may be attained?"

What will come out of this we have yet to see. The difficulty in the way of obtaining a proper site is considerable. The Art-Union of London has a large sum of money in hand applicable to the provision of a gallery for the exhibition of works of art, and the Council of that body has made several endeavours to obtain land for it, but hitherto without success. If a union of these two funds could be usefully brought about, the difficulties might perhaps be lessened. This idea, which has occurred to us on the instant, has sufficient promise in it to prevent us from overlaying it with any further gossip. We commend it to the consideration of those who are concerned.

THE ARCHITECTURAL PUPIL.

WHATEVER may be thought of the value or importance of such meetings as those of what is called the "Architectural Alliance," where a small number of delegates, by no means representing all the provincial or leading architectural societies, meet with closed doors to debate on the advancement of the profession, the recent printed reports of the last meeting furnish us at least with some new data as to the position of the architectural pupil, in the provinces especially, which are not without interest or significance. That much-neglected young man is at last to receive some tardy attention, his present position to be inquired into, and his future welfare and instruction are to be at least discussed, if not immediately or adequately provided for. We put a distinction between the question as referring to London and to the provinces, seeing that the facilities, for self-education at least, in London are so out of all proportion superior to those attainable in any provincial town, that the direction in which improvement seems to be called for is quite different in the two cases. Taking the Report of the London Architectural Association, furnished in reply to a request from Mr. Rickman (hon. secretary to the Architectural Alliance), we find the main complaint of those who draw up the Report is that the students do not take advantage of the numerous opportunities for instruction open to them, including all the lectures at King's and University Colleges, the Royal Academy, and the Royal Institute of Architects, the Schools of Art and libraries at South Kensington, the Architectural Museum, the British Museum, &c., and, we may add on our own part, the advantage of living where buildings on a large scale are constantly being carried out, and can be inspected and studied in progress. The neglect of these golden means of improvement is not, however, charged by the report entirely, or even mainly, on the idleness or indifference of the pupils themselves, but on the fact that they are kept too close to their office-work, and are not allowed time enough by their principals to attend lectures, and to practise sketching and prosecute private study; the steps taken for the improvement of the pupil by his principal amounting in general, it is said, only to the ordinary routine of office-work, accompanied by "suggestions" as to the desirability of attending the evening lectures of the association, &c.,—a cheap way, certainly, of doing your duty to your pupil. Then the Association is also of opinion that a serious hinderance in the way of useful and exhaustive study lies in the fact that the great facilities for acquiring information in London have not been embodied by any one "in a definite or accepted system." Still the facilities are there, *in posse*; and, given a desire for knowledge on the part of the student, and a reasonable liberality as to allowance of the requisite time on the part of the principal, it really seems impossible that any man of good ability should not be able to amass a quantity of valuable information in the course of a few years, although it might not be attained in the most systematic manner, or at least the pupil might have to systematise it for himself.

Turning from the report of the London Association to those furnished on the same occasion, and in answer to the same schedule of questions, by the Architectural Societies of Birmingham, Liverpool, Manchester, and Glasgow, the difference as to the available means of education existing in these large provincial towns, as compared with London, is remarkable. Scarcely anywhere do there seem to be regular lessons or courses of instruction in strictly architectural subjects, unless we include under that head the fortnightly papers, regularly read during the session of the Liverpool Architectural Society, some of which have appeared from time to time in our columns; but these are often rather theoretical than practical, and of more value to advanced members of the profession than to students. It appears that in connexion with the Liverpool Institute, where *inter alia* are taught mechanical statics and dynamics, and drawing from casts, &c., there were also formerly special architectural and building classes, which have been discontinued "from want of attendance." In Manchester, again, there is a school of art and a Mechanics' Institute, "in both of which architectural drawing is taught; the latter is attended principally by artisans in the building trades, and nearly every architectural pupil has attended at one period or another the former; *but as neat draughtsmanship appears to be the sole object*, the constructional and practical branches of the profession are consequently neglected?" In Glasgow there is a school of design, but we learn nothing about its practical value, or the extent to which the pupils avail themselves of it. But one thing that specially strikes us in looking at these documents is their beautiful and touching candour. In place of making the most of the possible good intentions of the architects of each town as to instructing their pupils, all these reports are unanimous in representing that the duty of the architect to his pupil is systematically ignored. The Birmingham report says,—"Articled pupils are left pretty much to themselves with regard to obtaining knowledge beyond the usual office work;" and adds with great *naïveté*, "Our society does not take any steps towards the improvement of art-students." The Liverpool report states, that "in the majority of offices very little systematic instruction is given to pupils,—in some cases none;" and also that very little opportunity is given to the students of visiting buildings in progress, and making practical acquaintance with the details of their profession; a very important point in architectural education. In Manchester "the steps usually taken during the term of articles for the advancement of the pupil are so very insignificant, that we may safely state them, with a very few honourable exceptions, as none whatever." The Liverpool and Manchester Societies, however, unlike the Birmingham, have endeavoured to atone for the neglect of their pupils by individual architects, and the absence of means of self-instruction in their respective towns, by instituting classes in connexion with each society for instruction in matters connected with the profession. Thus, the Manchester Society has a class for design and construction on Monday evenings, a modelling-class on Wednesday evenings, and a figure and free-hand drawing class on Friday evenings; and on Saturday afternoons there is a class for water-colour drawing. The Liverpool Society, besides offering prizes for designs and sketches both in summer and winter, has a figure-drawing class meeting two nights in the week. The reports of both societies, however, complain of the want of attendance at the evening classes, though the Liverpool Society's report states that the students' prizes are actively competed for, and with results creditable to the competitors. As to the Glasgow Society, Mr. H. K. Bromhead, in his report on their behalf, disposes of all preliminary systematic education at one fell swoop. They do not trouble themselves with the pupil's education; but they have an Institute incorporated by Act of Parliament, entrance into which is supposed to be the grand object of the pupil's struggles; and as this entrance is not obtained but by passing an examination as to proficiency, it is supposed that here is sufficient inducement for the pupil to educate himself as well as he can. So far as we understand the report, at least, the architects do not attempt to educate the pupil; only he cannot come into the Institute unless he is educated. But, then, the Glasgow architects do not take premiums, which Mr. Bromhead seems to think is their "weakest point;" on the contrary, the pupil is paid small sums during the latter years of his apprenticeship; and, on the whole, it is certainly better that architects should openly declare their intention of doing nothing for their pupils, and act accordingly, than that they should pocket a few cool hundreds and pursue the same *laissez-faire* system after all, without acknowledging it. As to the means to be adopted for the future amelioration of architectural education, none of the provincial societies offer any express opinion, except the Liverpool one. The committee who drew up the report are of opinion that much must depend on "the recognition by individual architects of their responsibility towards their pupils;" but we must be allowed to observe that the fact that much does depend upon this, is just one of the evils of the present system; our architectural education ought to be independent of the caprice or conscientiousness of particular individuals. The Liverpool committee, however, further express their conviction that:—

"The strongest inducement to the improvement of architectural education would be the establishment of a *compulsory* examination for those who wish to enter the profession of architecture; such examinations being held in the provinces at conveniently situated central towns, if possible, but nevertheless in connexion with a governing body in London, such as the Royal Institute of British Architects; or in connexion with the English universities, if these latter should be brought to recognise the importance of art education, and provide for it in an adequate manner."

"Much virtue in an *if*," but this last "if" is one which we shall have to wait some time for. The committee also suggest the formation of a lending library, on an extensive scale, of architectural works; a project which has been mooted before, but never seems to have met with sufficient support to induce any one to take it up, and become the Mudie of the architectural world.

The report of the general committee selected from the Royal Institute of Architects, the Royal Academy, the Architectural Museum, the Architectural Association, and the Architectural Exhibition Society, to examine into the defects and possible remedies of architectural education, goes (as might be expected) much more fully into the subject than any of the previously-mentioned documents. Their salient propositions are, first, "That a certificate be granted to all who pass the voluntary architectural examination:" that at some future period "the membership of the Institute be made dependent on the passing of the voluntary architectural ex-

amination in the class of proficiency;" and "that a preliminary examination be held in elementary subjects, open to all students who have been at least one year in an architect's office." The object of the last is to encourage the student early to the habit of systematic study of the elementary knowledge connected with his profession, that he may more readily understand what he is working at, and lose less time. This would certainly be a good step, and would help to convince the pupil from the first that he was entering a profession requiring systematic study to master it: a conviction which we imagine is wanting to a good many of the young gentlemen who are at present knocking about in architects' offices. Then, taking into consideration the great facilities afforded in London for self-education, and the absence of anything like a systematic use of them, the committee suggest the preparation of a text-book or pamphlet, containing a complete curriculum of study for the architectural student, and especially pointing out when and where lectures specially pertaining to the profession can be heard, and giving a limited number of books in which the best information can be had in a condensed form. This the Institute have determined on providing.

That such a book, carefully drawn up, will be of the greatest use to students who have not the good fortune to be placed with a master willing or able regularly to educate them, there can be no doubt whatever. The committee urge the complaint, which is also made in the reports of one or two of the provincial societies, that the students make very little use of the opportunities now within their reach. There must be some reason for this. One cannot suppose that architectural pupils alone, of all students, are idle and good for nothing. The fact is, that there is no sufficient definite inducement to study hard, no assurance that without hard study the profession cannot be taken up and exercised. Young men intending to enter the professions of law and medicine know from the first there is a stiff examination awaiting them at the end of their period of study, which they *must* pass, or lose the whole time they have spent in study; but the architectural student sees that men constantly get good commissions through the interest of their friends, without possessing any remarkable natural talent, or spending any of the midnight oil in hard study, and he naturally hopes that he will be able to do even as these; and, in such case, it is difficult to entice him, as the good lady in the rhyme enticed her geese to "come and be killed" in a voluntary examination. He cannot be led—

"To scorn delights and live laborious days"

in the hope of passing, when he knows that Jones, who has wasted his time in sporting with Amaryllis in the shade, and snaps his fingers at the examination, may, after all, get into just as good, or better, practice; for we all know that interest often goes a great way further than talent. The committee think, that one reason why the great number of lectures and other means of improvement attainable in London are not more used, is that principals do not allow the pupil time for them in the daytime (a complaint echoed by the Architectural Association), and they urge that subjects which are necessarily constituent parts of architectural education ought to be learned during office hours, in place of the pupil being compelled to spend his evening over them. Nothing more true; but then what is the advantage of the considerations to a pupil in the provinces, who is not within reach of all these lectures, and museums, and exhibitions? It may, of course, be said that he should come to London for his education; but are the London architects to be expected to find room in their offices for all the young men from the country who wish to study for the architectural profession? The more we go into the subject the more evident it becomes that the whole system requires altering. These kind of half-measures, which provide first for placing a lad in an architect's office, and then for getting him out again at intervals to learn what he cannot learn, or is not likely to be assisted in learning while there, supply no really systematic course of education. It is a very uneconomical method of using the time during the period of study, to mingle up together office routine, and attendance upon lectures, and drawing-schools, in an irregular in-and-out way; it is not in such a manner that either the practical or the theoretical portion of the profession is likely to be thoroughly learned. What we want is the establishment of architectural schools or academies on the same system which has been long adopted on the Continent, where the principles of architectural design and construction, and the necessary supplementary branches of drawing, can be definitely and systematically taught by persons adequate to the task, where the student may apply himself to the acquirement, on a theoretical basis, of all the main branches of knowledge necessary to his professional success, without finding the regular and consecutive course of study disturbed and broken up by the details of office work. The knowledge of these latter can be acquired afterwards, and will be acquired in a much shorter time when the student comes to them with a previous knowledge of the general bearings and scope of his profession, than when (as at present) he is turned loose into an office to grope his way into the details of the work by degrees, and trust to finding out the general value of them afterwards.

We cannot just now go into the question, how such academies may be instituted, who is to institute them, and how they are to be supported; probably an appeal to Government would be necessary, and in that case we might hope that it would be the more easy to obtain governmental recognition also of the examination which should follow. Without saying that no one should be allowed to practise as an architect unless he has passed a prescribed examination, two things we wish to see done, without which no thorough reform can be accomplished; we wish to see the term "properly educated architect" legally defined by some qualifying adjective (say "certificated architect") which may distinguish the bearer of it from the jerry-builder who writes up "architect" over his door; and we wish to see "the architectural pupil" altogether eliminated, and the architectural *student* taking his place.

COLOUR AND SOUND.

IN examining the history of the physical sciences we cannot fail to be struck with the gradual tendency of their various laws towards unity.

The phenomena of each branch mutually illustrate each other, and the more they are studied and compared the more it becomes manifest that all are obedient to the same essential laws and governing principles, differing only in degree, and in the results the same operating forces produce.

In obedience to this principle, already we have striking analogies between light, heat, electricity, and sound, and we believe that the time will come when all the more common phenomena of nature will be found influenced by a few general laws common to each. Unfortunately for scientific education, phrases originally merely poetic becoming common, are apt to be so assimilated, as it were, that we fancy we understand their sense, without giving much attention to the absolute meaning of the words composing them. The harmony of colour will be spoken of, and apparently understood, by many to whom the true scientific explanation of the expression is entirely new.

That there is a similarity between the impressions produced by a painting and those produced by a musical composition, is a fact so long undoubted that an analogy between sound and colour has for some time occupied the attention of both painters and musicians; but with the exception of the remarkable results obtained with the prism and the monochord by Newton, no advance seems to have been made to the scientific application of musical harmony to the art of painting. It has remained for Dr. Macdonald * to bring forward a clear and provable theory. Just, then, as a note depends upon the number of vibrations of the string or other instrument causing it, so the colour of the light ray depends upon the number of its undulations. It has been found that the undulations of the colours of the iris increase in number and diminish in size as they ascend from the base red to the violet, just as happens in the musical scale in passing from the graver to the more acute sounds.

Can we but work out the precise relationships existing between the two scales, painting may be elevated to the status of a science, based, like music, upon mathematical principles.

Surely we may the more assume this step toward analogy to be correct from a knowledge of the physical effect of heat—expansion; and we find that the heating power diminishes in the respective light-rays as they advance up the scale.* Pointing out first the similarity between the seven notes in the musical scale, and the seven prismatic colours, Dr. Macdonald says that "the primitive colours, red, yellow, and blue, occurring respectively upon the first, third, and fifth intervals in truthful analogy, independent of coincidence or fortuity of any kind, may be said to compose the perfect chord of colour answerable to that in music, which all musicians admit to be the very groundwork and basis of harmony."

Again, we may fairly argue that pitch in sounds is equivalent to tint or hue in colours, determining their relations to each other. In confining his attention to the natural key in music, that commencing with the note C, Dr. Macdonald assumes red to be its analogue in the colorific scale, and for this assumption there are several favourable arguments.

As was before remarked, red is the least refrangible of the primitives, and its vibrations are longer and slower than those of any in its own series. This, too, is the case with the key-note with reference to the other intervals of its scale.

It would be difficult, in the small available space here, to give even the rudiments of harmony: we must be content with remarking that sounds in unison are those whose respective undulations render it possible for them to act together, without interfering with or neutralizing each other,—without, in short, infringing the law of "interference."

Speaking technically, and quoting from the above-mentioned author,—

"From the study of their properties and offices the different intervals of the musical scale have received appropriate names: thus C is denominated the tonic; D, the super-tonic; E, the mediant; F, the sub-dominant; G, the dominant; A, the sub-mediant; and B, the sub-tonic. The word 'tonic' is always applied to the first or key note; the dominant to the fifth, from its predominance in harmony; and the mediant to the third, from the position it holds between the tonic and the dominant."

It will occur to every musician, either practical or scientific, that every note in the gamut may be supported by a fundamental bass note, with its third and fifth forming the common chord. There are but three chords required on the bass clef, the first founded on the tonic, C (red), E (yellow), and G (blue); the second on the sub-dominant, F (green), A (indigo), and C (red); and the third on the dominant, G (blue), B (violet), and D (orange). The painter is advised to choose first his key, and then to translate some good harmonic phrases into colours most befitting the nature of his subject; and to the determination of a key a clear perception of the fifth interval, the dominant colour, is essential.

"In giving an account of the complementary colours, it is usual to adduce the series resulting from the binary mixture of the primitives, forming a sort of colorific hexachord, like the old musical one in which the seventh interval, equivalent to violet, was wanting. Had Guido, the monk, taken the prismatic scale for his guide, instead of in effect making a mechanical mixture of the three major constituents of the diatonic scale, he would have transmitted a still greater name to posterity."

Alternate colours produce common chords, red, yellow, and blue answering to C, E, and G, and orange, green, and purple to D, F, and A.

If we take one primitive, say red, the other two, yellow and blue, must exist, either separately or in its complementary, green; or, taking a compound colour, purple, composed of red and blue, its complementary will be found either in the opposite colour, yellow, or in the alternate compounds, green and orange, taken together.

We may here notice the analogy in effects of "interference," both in colour and in sound: yellow is said to be "indifferent" to green, red to orange, and violet to blue. Musically speaking, these intervals, being seconds, are positive discords; and, speaking of colour scientifically, we may notice that a green opposed to a strong yellow appears blue, a purple to a blue red, and an orange to a red appears yellow; the fact being that the undulations somewhat interfere with each other, and similar ones interfering with and nullifying each other, the solitary colour stands out with undue force. With reference to complementary sounds,—

"If a string sounding C be divided into four parts, 1-4th and 3-4ths will also produce C; but the complement of 1-4th are 3-4ths, yielding F, which is equivalent to green, the complementary colour to red. Divide the strings into five parts, 1-5th, 2-5ths, and 4-5ths will produce E, yellow; but the complement of 2-5ths are 3-5ths, yielding A, the equivalent of indigo or purple, which is the colour required."

* "Sound and Colour: their Relations, Analogues, and Harmonies." By T. D. Macdonald, M.D., F.R.S.

* See *Builder*, May 8th, "On Scientific Origin of Artistic Notions."

From these facts, the inference that complementary colours are, as it were, chromatic harmonies, is undeniable; and from these, too, we may account for the complementary impressions which arise on the retina when some particular colour long impinging upon it has been removed: it would appear that its surface, when long excited by the influence of a particular colour, is more susceptible of the vibrations of its complementary in white light.

Dr. Macdonald does not fail to show the scientific analogy between the structures of the human eye and ear, and the harmony between the sensations perceived by those organs. We must refer the reader to his little work for these interesting details. There has been a time when it was sufficient for the thinking man to give the world his thoughts, but with the present practical and somewhat hasty age, the cry is ever, *Cui bono?* Of what *use* can you make your discoveries? And to this inquiry the mind of genius at most times responds, feeling that to compass the greater good it must sacrifice somewhat to the less intellectual though more practical of its fellows.

Thus the ingenious gentleman we have quoted points out how many of the great masters were practical musicians as well as painters, and profited accordingly. "What is termed 'Gusto' in colouring is intuitive to the painter of genius, as musical taste is a natural gift to the born musician, who may compose and harmonise pleasingly, though ignorant of its rules."

We may remark Salvator Rosa, Carl Antonio, Guido Reni, Julio Romano, one of Raffaelle's most excellent disciples, as instances of painters being at the same time musicians; and Dominichino, whose talent lay principally in the correctness of his style, and his power of expressing the emotions of the mind, was a thorough scholar in the theory of music.

But though natural taste has achieved great things in the graphic art, a scientific rule may be most advantageous to those not so highly favoured, and surprising results otherwise undreamt of may be developed. In a general sense, the lower the refrangibility of a colour the nearer it will appear to the eye; the more refrangible the greater will be the apparent distance. Thus, red being the least refrangible, will generally predominate in the foreground; yellow, green, and such intermediate colours in the middle distance; and blue, being the most so, with every variety of greys, will form the background of mountains, vapours, horizon, and sky.

A most striking effect has been accomplished by Paul Veronese, with much musical perception, in his picture of "The Marriage of Cana in Galilee":—

"The Redeemer, who is here the principal figure, is carried somewhat back in the picture, and the painter, who could not properly distinguish him by mere lights and shadows, clothed him in red: the least refrangible, and therefore the most approximating colour of the scale, so as effectually to conduct the eye to that figure."

Now, the first essential is the choice of a key. A definite key-note—say red—must first be fixed upon, and then the proper and dependent colours must be localised according to the painter's own taste and judgment. This note must necessarily hold the most central and prominent position in the picture, and the arrangement of the chords of the dominant (blue) and the sub-dominant (green) must be determined by it.

"The Taking Down from the Cross," by Rubens, is a peculiarly celebrated example of this arrangement. John is here the key-note, and the red drapery is in wonderful harmony with the colours in the immediate vicinity. "To the left we find the other components of the perfect chord, and to the right the common chord of the sub-dominant, the first interval of which is given in the green drapery of the female figure kneeling."

The three Marys are clothed in drapery answering to the third and fifth intervals; Joseph of Arimathea, a prominent character in the story, has colours corresponding to the tonic mediant and dominant. Two assistants are judiciously introduced, wearing also drapery in direct harmony, and in suitable places passing colours of limited extent are added, to promote the general effectiveness of the composition, as passing notes add grace and set off the agreements of a musical theme.

Doubtless among the old masters very many pictures might be adduced as examples of pleasurable sensations being produced by arrangements which may be scientifically analysed and found in harmony with the foregoing rules; and doubtless, too, on the walls of the present Academy of Arts many works will stand the test of severe musical criticism, and not be found wanting. For the encouragement of those who may fail to pass this searching examination, we may point out the picture of "Bacchus and Ariadne," justly reckoned a masterpiece of Titian. Dr. Macdonald says that it,—

"When translated into music, affords full harmonies, but there is an undue force in the dominant, as compared with the other intervals of the perfect chord. An excess of this kind is of course quite as possible in music as in painting. Were the notes one and three sounded together, and a fifth of inordinate strength then introduced, the latter would naturally counterbalance the other notes, and obtrude itself painfully on the ear."

"Musical rule would prescribe a reduction of the power of the fifth to equalise the harmony, and the same principles should be recognised in painting, viz., to preserve equality in breadth and strength of the components of all colorific chords."

"Trusting to the truth of musical analogy, we are in no fear of incurring the charge of presumption in thus noticing a slight defect in a noble picture so often, and so justly quoted by critics as a standard of art in colouring." He notices that the companion to this picture however, Jupiter and Europa, in the Bourgeois collection, also by Titian, and painted in exactly the same key, has the common chord in perfection, the dominant being kept within due limits, and the harmony complete. Dr. Macdonald winds up his interesting pamphlet by deploring the tendency of modern paintings to lose their colour after the lapse of a few years. This he ascribes to an erroneous principle in the mode of colouring, involving too many processes, and to the chemical action arising from the mixture and intermixture of various tints.

Pictures painted by the old masters on the transparent principle 150 or 200 years ago seem but to be gaining in appearance, and improving in mellowness and beauty, while the portraits in the Dulwich Gallery are already faded,—Mrs. Tickle, Mrs. Sheridan, and the Moody family, presenting a sad and unhealthy aspect.

Pure linseed oil, both in a boiled and in a raw state, seems to have been the only vehicle for colour employed by the old masters, and we have no evidence to show that varnish of any kind was used with their paints.

Oil, as it were, insulates the molecules of the pigments, and preserves them from extraneous agencies, and even from chemical changes, with the atoms of other pigments commingled with them in tinting.

"It stands to reason that every absorbing surface, as in the bibulous grounding material of some kinds of prepared canvas, added to the want of binding and the evanescent nature of the vehicle itself, will sooner or later deprive the pigments of their protective matrix, exposing them to the action of new affinities, to the utter destruction of the pictorial effects they were intended to sustain. Soap and water would very soon undermine such colouring, whereas they may be fearlessly employed, if necessary, in the superficial cleansing of pictures painted with linseed oil."

Do not the foregoing remarks explain much that, in our sensations, has been incomprehensible? We have felt the effect surely when the sun has suddenly burst upon the landscape on a dull April day. Is it not the same when an accomplished organist suddenly introduces the "principal stop" into his "fugue," and on the swell organ chases it from the dull tones of the diapasons to the brighter and more striking ones of the "hautboy" and the "trumpet"? And in the endeavour to assimilate the foregoing rules, and to hear with the inner ear the melody both of pictorial art and of nature, are we not struck with the extraordinary musical crescendo and diminuendo effect of our English summer, when the swell organ of the sunlight affects the feelings with tenderness by its soft and fascinating impulses?

The light cheerful strain of spring upon the upper notes of the scale, and with but half-developed harmonies, the yellows and the greens, and the delicate lightly moving shadows, an air played, as it were, solely in the treble clef, gradually swelling upward, and slowly strengthening as the deeper notes of the summer tone the yellow into orange, and tint the green with a darker hue; while the high lights are brought forward, with great force, as the brilliant effect of the solar light, "the principal" mingles with and freshens up the whole.

Then, too, begins to appear more strongly the tonic, the key-note of the picture, and from sky and forest, the red light gleams in the middle distance, bringing it closer and into more familiar relations with our sympathies. Browns of every hue form an under-current of melody in the foreground, while infinite degrees of grey, and the cool upper tints of the scale, form a background of mountains, mists, clouds, and skies. Then the lessening energy and the diminished effects as the autumn dulness casts its shadows over, and, as softening melody appears to die away into distance, the foreground occupies the now prominent position, while the horizon vanishes, and the middle distance fades into the background. Then, as the fugue slowly descends the scale to the quiet resting-place of a deep bass note, some transient flash of old summer weather once again lights up the picture, the orange and the red reflecting back their colours over field and forest from a glorious sunset, the blue distance deepening to a violet, and every variety of rich and full chords boldly and brilliantly struck, while the "tenor" of the fallen leaves and the deep bass of the darkening shadows fill the soul with harmony, the true music of nature.

"And now the golden coves where autumn lingers
The never wearied hours have left behind;
Winter o'er all the hills with frosty fingers
Hath spread its pall of mist upon the pines."

And as the brighter high lights die away in the evening, and the darker masses of shadow creeping slowly up, throw the scenes far into the distance, the glorious pictorial anthem is left,—left to the last few notes on the mediants, to the repeated bass, and to the deep dark silence of winter.

S. S.

THE DECAY OF STONE.

I HAVE perused with interest in the *Builder* of the 12th ult. the abstract of a paper "On the Building Stones used in the Metropolis," and read before the Civil and Mechanical Engineers' Society by Mr. Arthur C. Pain.*

There are, however, one or two points upon the causes of decay in stone in which I must differ from the writer. The error into which he has fallen is, unfortunately, a very common one; but why it should be so, or why so remain, I can see no sufficient reason.

It is reported in this paper that the decay of stone was caused by *bad selection!* and proof is assumed that certain buildings erected in proximity to quarries from which the stone was obtained, are in good preservation; and that buildings erected in London of similar stone were more or less in a state of decay.

Unhappily, no specific reference is made to the kind of stone, nor the buildings in which it is used, whereby they may be identified. I do not pay much heed to the statement of local masons understanding the stone better than their city brothers; indeed, most of the London masons are from the great stone-producing districts, and really the operators have virtually little option than to obey instructions.

No doubt, a proper selection in material, and the stone being fixed on a natural bed, have much to do with prevention of decay; but these are points well known.

Now, it is a fact, which has been already shown in this journal, that a stone eminently suitable for country districts *may be* altogether unsuited for the buildings in a town; a case in point being the Houses of Parliament.

The difference arises from atmospheric causes—chiefly gaseous contamination; and as the magnitude of a town and the importance of its manufactures increase, so it may be that a stone will be more and more unsuitable. The classes of building material to which I refer especially are those known as magnesian limestones—commonly and erroneously termed "Dolomites;" and also, though in a less degree, to all stone containing magnesia.

I may state that as the quantity of carbonate of this earth, as a constituent of any stone, becomes less,—the objection decreases.

The objection to material of this sort in certain localities arises from its component parts being more or less rapidly decomposable from the presence of acids of sulphur always existing in the atmosphere, particularly in populous districts, its source being primarily the oxidation of sulphur, during combustion of coal, a portion of which acid combines with ammonia, and, no doubt, some remains as free acid.

From the affinity which exists between this earth, — magnesia, — and sulphuric acid, they readily combine; and, as the resulting sulphate of magnesia is very soluble in water, it is easily conceived that any building material into which magnesia enters must quickly undergo what is termed decay; and, let me observe, that as the porosity of a stone and its power to absorb

* See p. 461, *ante*.

moisture increases, so does its liability to destruction, independently of disintegration by frost. Calcareous and sand stones frequently deteriorate in small patches, in holes or veins; that is, in stones which are sound when first prepared.

I have sometimes examined these defective and also the sounder portions, and generally found the first to contain a few per cents. of carbonate of magnesia, whilst the latter have been free or nearly so. I do not know if this has been before remarked by other observers. However, it should not be lost sight of,—it is important. Of course, when the coherency of a part is destroyed by removal of some of its particles the thing easily crumbles, and such is the case with these limestones.

It is somewhat singular that in the same number of the *Builder*, under the head of "Church-Building News," will be found an error somewhat like that of Mr. Pain's, but more significant. The words are few, and I will repeat them; they are worth the attention of observant students.

In describing the building of a Presbyterian Church at Leicester, your correspondent says: "The building generally will be faced with rock-faced Bulwell stone, which has been preferred to the *granite* rubble of the locality, as being in itself *equally durable, and forming sounder masonry*." (!) Let me observe, *en passant*, that the granite of this locality, although granitoid, is not granitic, but syenitic: a true granite I have not seen produced by the Leicestershire quarries. This is of no importance; yet I mention it because many of your readers are unaware of their *not* being granites. But to the point: My curiosity was somewhat incited to know what stone was equally durable with granite, and forming sounder masonry! I procured a few specimens, and confess a glance raised my suspicion of its goodness. Not a bad-looking stone when seen in the work from a distance; but examination shows it as a very porous mineral,—somewhat as if air had been blown through a mass of crystals. The substance was evidently a lime, and may belong to any formation, geologically, above the "New Red." It is somewhat pulverulent, especially when dry. Its crushing power must be low.

The result of analysis indicates that the stone as a building material is unsuited to urban atmosphere, for it contains upwards of 22 per cent. of carbonate of magnesia, which in Leicester, with its number of manufactories and great consumption of coal, must and will become converted into "Epsom salts," and the natural porosity of the stone will considerably tend to assist in its destruction, apart from the action of frost.

ANALYSIS OF BULWELL LIMESTONE.

Soluble in Acids.	
Water	1·91
Aluminia and protoxide of iron, with trace of manganese	10·96
Carbonate of lime	53·28
Carbonate of magnesia	22·56
Alkali	00·35
Insoluble in Acids.	
Silica, aluminia, peroxide of iron, and traces of lime, magnesia, and manganese	10·94
	100·00

The water absorbed is 9·27 per cent., or 1 part in 10·999.

In determining the aqueous absorption, a specimen was thoroughly dried in hot air for eleven hours, and subsequently immersed in water for seven hours,—not a very stringent test. The absorbing power of Portland and Bath stones, I believe, are respectively 1 in 16 and 1 in 13.

In conclusion, let me add my caution against the use of this stone in positions of atmospheric gaseous contaminations, &c., inseparable from a large manufacturing town, for I consider it inferior and inapposite.

Let me add one word, that it would be interesting to know upon what probable grounds the material in question was described and considered by your correspondent as "has been preferred to the granite rubble of the locality, being in itself equally durable, and forming sounder masonry."

W. R.

Dumfries Infirmary.—With reference to a paragraph in a previous Number (p. 492, *ante*), Mr. Starforth says the original estimate for his design did not exceed 10,000*l.*, but on the contrary was 9,250*l.*, and the working plans now produced are not in an amended form, as they are strictly in accordance with the original designs. The highest tender was 10,875*l.* 19s. 7d. and the lowest 8,650*l.* 9s. 8d.

HOPE FOR THE MINERS.*

AGAIN from out the pit's black mouth arise
Appalling shrieks for help; heartrending cries
Of stifling miners, who, beyond the gloom,
Lie scorched and shrivelled in a fiery tomb!
Down the black shaft a hundred heroes go
With generous eager haste, though well they know
'Tis *death* to venture in the "fire-damp" wave
That laves their dying mates; recklessly brave
They rush, in hopes to bring back one dear life,
To agonising mother, child, or wife.
Too oft their noble self-forgetting zeal,
Bears them within the gulf, whose flames reveal
Its hellish work, and with their lives they pay
Forfeit for haste that will not brook delay;
And thus the fearful death-roll is prolonged,
And the pit's mouth with dead and dying thronged.

Is there *no* hope? Can nowhere help be found
To stop this wholesale slaughter underground?
What has experience done in all these years? . . . .
Take for reply those harrowing shrieks, those tears
That thickly rain from widows', orphans' eyes,
As, one by one, from out the pit arise
The scorched and mangled forms they scarcely dare
To look upon, lest those they love be there!

But hark! a calm majestic voice I hear,
That checks the sob and stays the welling tear;
'Tis Science speaks: "Mortal, I give to thee
My fairest child, bright Electricity;
Let but her holy light for ever shine
Through the dim pathways of the fatal mine,
And free from danger, free from gnawing dread,
Securely thou may'st walk whilst by her led." . . .
Can this be true? Is there, indeed, a charm
To guard the 'venturous miner's life from harm?
Up, then, ye pit-owners! Up, every one!
Ere yet another day its course has run,
Make,—at least, make,—a trial of the gift!
If it succeed or not, your efforts lift
From off your consciences a heavy load,
Which else had burden'd you along the road
To Heaven,—perchance proved an avenging rod
To drive you thence; and, looking up to God,
But watching, working still, we'll humbly pray
A blessing on the New Hope of to-day.

R. F. H.

* Suggested by the proposition in the *Builder* by Mr. R. Taylor, an ingenious working-man, to employ sparks of electricity in coal-mines, to detect and consume dangerous gases as soon as evolved, which proposal was afterwards taken up in Paris, and made the subject of a paper.

THE TRADES MOVEMENT.

Liverpool.—A letter to the local *Journal*, from the Secretary to the Liverpool Master Builders' Association, dated South Crescent-chambers, 6, Lord-street, June 24, says:—

"I beg to enclose you a copy of the wages offered by the Master Builders' Association to competent masons, as an answer to the misstatements made at the trades meeting, held last night at the Oddfellows' Hall, in reference to reducing the wages of the masons in winter by the hour system."

The offer to masons is as follows:—

"There are 250 free-labour masons now at work in Liverpool, and there is constant work for 200 more. The masters invite all masons who wish to think and act for themselves to assist them in their endeavours to free the town of Liverpool from trade union tyranny and dictation (which have had the effect of injuring to a great extent both the trade and the best interests of the workmen), by accepting the employment offered. The wages offered are 7½d. per hour, or 33s. 2½d. per week in summer, and 7¾d. per hour, or not less than 30s. per week during the shortest days in winter, with constant employment. Masons, hasten to accept these advantages, and you will find the masters to be your firm friends and supporters. Do not be misled by the emissaries from Liverpool, who make false statements to mislead you, that they may be enabled to live in luxury at the expense of their dupes. Apply to William Wood, secretary of the Liverpool Builders' Association, South Crescent-chambers, No. 6, Lord-street, Liverpool; or to any of the employers in Liverpool, who will enter into special engagements as to the payment of fares to Liverpool."

The offer is dated 21st June.

Manchester.—Strenuous efforts have been made by the master builders, during the last two or three weeks, to procure non-union workmen, and a number of men have been brought to the town; and a fortnight since there were already at work upwards of 300 masons and 150 bricklayers. During the following week, however, the brickmakers took up the quarrel, and refused to make or supply bricks to be set by non-union bricklayers. This is likely, we understand, to lead to the introduction of machinery into Manchester for the purpose of making bricks; and, seeing that there are about 70,000,000 made annually in this city and the immediate neighbourhood, it is rather surprising that it has not been done before. Manchester is one of the very few large towns in England where bricks continue to be made exclusively by hand. Two or three companies and individuals have established brickmaking machinery, but the operative bricklayers have refused to set them, and the hand-brickmakers have refused to supply bricks to any master who attempted to use for any purpose bricks made by machinery. The consequence has been that all such efforts have had to be abandoned, and have resulted in loss, if not ruin; but in none of the previous efforts had the master-builders taken a part. They, it appears, went on in the old way, unwilling to encounter a strike as long as it could be avoided; but now, we are told, the matter is to be taken up by the trade. The masters have resolved, it seems, to establish, if possible, free trade in bricks as well as in labour.

The operative carpenters and joiners of Northwich and neighbourhood having given the masters notice of alterations involving a reduction of 2½ hours per week during the summer months and an advance of ½d. per hour throughout the year, an equal number of masters and workmen met to consider the subject. On the part of the masters it was contended that the trade of the locality, much less the general trade of the country, did not warrant any change having a tendency to increase the present price of labour. In proof of this the monthly state of the operatives' unions of this trade was quoted. In one report (that of the Amalgamated Society) there appeared only six towns, representing 140 members, where trade was good, against 105 towns where it was either slack, dull, or bad, and nearly a similar number said to be only moderate, steady, or improving. Another association (the General) represented matters to be even worse. It was also contended that anything tending to make work in winter unnecessarily dearer than in summer was most suicidal to the interests of the greater portion of the workmen, and that the time worked and the wages at present paid in this locality compared favourably with many towns, in and out of the county, of much greater commercial importance than this. On the other hand, the operatives maintained this was otherwise in several neighbouring towns, such as Warrington, Altrincham, Runcorn, and Chester, where the wages were greater and the time worked less. The result of the meeting was an amicable readjustment of the present rules, chiefly as to phraseology and the number of weeks to constitute the winter months, the working hours and wages to remain as at present. The new rules were signed by Messrs. Beckett, Drinkwater, and Bostock, on behalf of the employers, and by three of the operatives.

It is understood that the dispute between the operative masons and master builders of Bristol has terminated, the masters finding themselves, owing to a want of union in their body, unable to continue the contest.

The masons' strike at Halifax has terminated. The men have returned to their work at the old terms.

The house-painters of Glasgow have resolved to close the strike, their belief being that if now adjourned, the advance of wages asked might be obtained without trouble at the beginning of next year. The men have been out since the 1st of May.

A large meeting of the joiners of Glasgow and the neighbourhood has been held in the Trades' Hall with regard to the nine hours movement. It was reported that eighteen employers were willing to concede the nine hours. Others had either not been waited on or had refused. It was finally resolved to defer the movement till the 1st of March, 1870.

A numerously attended public meeting, convened by the Mayor, in response to a requisition of the inhabitants, has been held at the Town-hall, Oldham,—

"To allow the working-classes an opportunity of expressing their opinions for or against the Bill now before Parliament, to amend the law relating to trade combinations and trade-unions."

The chair was occupied by the Mayor, who said he quite agreed with the spirit of the requisition, which set forth a belief that—

"Should the Bill become law, it would be the means of bringing about a better understanding between employers and employed, and consequently prevent to some extent those great evils, locks-out and strikes."

He proceeded to remark that the amount of money that had been sacrificed by strikes in Oldham was something incalculable, and any measure that could obviate the necessity of such a mode of dealing with questions affecting

labour would be a step in the right direction. A resolution in favour of the Bill was carried unanimously, and it was afterwards agreed that a petition in its support should be signed by the Mayor on behalf of the meeting for presentation to the House of Commons by Mr. Hibbert, with a request that Mr. Platt, the other borough member, together with the representatives of this division of the county, would give it their support.

SMITHFIELD MARTYRS' MEMORIAL CHURCH.

ON Tuesday last, being St. Peter's-day, the foundation-stone of the Smithfield Martyrs' Memorial Church, which is to be dedicated to St. Peter, was laid by the Earl of Shaftesbury. The site is in St. John-street-road.

It was originally intended to erect the Martyrs' Memorial Church in Smithfield, near to the scene of martyrdom, but this was impracticable. A tablet will, however, be placed there, recording the facts of history with regard to the martyrdom, and will, at the same time, direct to the memorial church, which will not be far from the spot. The edifice will in every respect be a "memorial," both outside and in, to the Smithfield martyrs. It is proposed to affix in some part of the building Chillingworth's motto, "The Bible, and the Bible alone, is the religion of Protestants." Beside this there are to be tablets to every martyr who suffered during the Marian persecution. As regards plan, the church will consist of a central nave, with north and south aisles, transepts, and a well-developed chancel, also with aisles, with a high tower occupying the north-west angle of the nave and north aisle. This tower will form a prominent object, reaching to a height of 120 ft. The lower story is to be an open porch, forming the chief entrance to the building. The western front of the nave will have a four-light window in the upper part, and two smaller two-light windows in the lower, the latter forming the lights of the baptistery. In the transepts there are to be rose windows above, and under the tower level a range of three lancets. Between the rose windows and the last-mentioned there will be, as respects the transepts, sculptured decoration in the shape of bas-reliefs, representing scenes from the Smithfield martyrdoms. The like bas-reliefs will also decorate the panelled spaces beneath the west windows of the nave and the west and north faces of the tower. The buttresses will terminate in canopied niches, containing statues, and the turret top and pinnacles of the tower will contain similar figures. The style of architecture is thirteenth century Gothic. The church is to seat 1,000 persons. The architect is Mr. E. L. Blackbourne. The contractors are Messrs. Dove, Brothers.

THE MISCELLANEOUS ESTIMATES.

ON the vote of 17,000*l.*, to complete the sum of 25,000*l.* for the acquisition of land for the purpose of the New Palace at Westminster, and further embankment of the river Thames, Mr. Layard said that the original estimate amounted to 150,000*l.* It had been represented to him that if a fire occurred in those houses near the palace that building would be seriously endangered. The vote was agreed to.

A sum of 34,026*l.* was proposed to complete the amount required for the buildings of the Houses of Parliament. Mr. L. King inquired if divine service was to be regularly performed in the crypt. Mr. Layard said it would be for the House to decide. Mr. Kinnaird said anything more monstrous than the expenditure upon the crypt could not be conceived, and for no purpose whatever. Mr. Bentinck said some absurd statues were lately placed in the Queen's robing-room and other parts of the palace. One of these represented Henry VIII., the fattest man of his age, as a very slight personage; another made William III. a tall man, though it was well known that he was short and small. Mr. Morley suggested that rooms should be provided where members could have intercourse with their constituents. Mr. Miller called attention to the largeness of the amount required for the construction of the subway to the railway station,—4,410*l.* Mr. Layard said he was quite aware of the want of accommodation in the interior of the building. The subway was constructed under a contract. Mr. White proposed to reduce the vote by 2,500*l.* for the purpose of preventing the proposed decoration of walls, to which, he said, the First Commissioner of Works had ominously referred, and which might involve hereafter some extravagant expenditure. Lord J. Manners thought there ought to be some further explanation. He understood that the First Commissioner of Works confined his remark to the central hall. Was the House to commence the redecoration of the Houses of Parliament? He wished to know whether Mr. Barry was of opinion that the elevation of the roof of the central hall would be in conformity with the style of the building. Mr. Layard said that what he proposed to do was recommended by the report of the architect himself. The central hall was so dark during a great portion of the day that gas had to be used. He did not intend to go further in the way of decoration than he had mentioned. The amendment was negatived. Mr. L. King moved that the vote be reduced by 500*l.*, the sum required for the crypt of St. Stephen. Mr. Kinnaird disapproved of the ornamentations in the crypt, and hoped the amendment would be pressed. Mr. Onslow stated that the ornamentations of the crypt were much admired. Majority against the amendment, seventy-nine. The vote was then agreed to.

BRISTOL EXCHANGE.

SIR,—At a meeting of the Bristol town council, on Tuesday last, it was decided, by a miserable majority of two votes, to utterly destroy Wood's fine old Classic Exchange, by putting over the open quadrangle a semi-elliptical roof of glass and iron, which was correctly described by Alderman Robinson as "the chump-end of a railway station," and by another gentleman as "a dish-cover." Having seen the model, I can state that a more unsuitable design for the purpose could scarcely be imagined; and I am quite sure that every professional man, and almost every citizen, who may see what is intended to be stuck up over the finest architectural work of the kind in the West of England, will be indignant that such an act of "Vandalism" is really intended to be perpetrated.

Pray, sir, lend your powerful aid to prevent this shameful act. W.

THE ROYAL COMMISSION ON WATER SUPPLY.

ON the 24th of December, 1866, a Royal Commission was appointed to inquire fully into the water supply of the metropolis and other large towns. This Commission, consisting of the Duke of Richmond, Sir John Thwaites, Col. Harness, Alderman Sir Benjamin Phillips, Mr. Thomas E. Harrison, and Mr. Joseph Prestwich, was re-appointed early in April, 1867. The report of the Commissioners, bearing date the 9th of June, 1869, has just been presented to Parliament. The origin of the Commission, it will be remembered, was due in a great measure to the public interest which was excited, during the autumn of 1866, in all matters connected with the water supply, more especially of the metropolis, through the uncontroverted evidence of its direct influence upon the mortality from cholera, during the epidemic which then prevailed. The report in question, no doubt, contains a valuable contribution to what was already known upon the subject; but considering the vital importance of the inquiry, and the circumstances under which it was instituted, the delay in its publication appears somewhat unreasonable.

The principal points to which the attention of the Commission was directed were,—first, the present and growing insufficiency of the water supply in the metropolis and other large towns, and the consideration of different suggested sources for supplementing or substituting that supply; and, secondly, the pollution to which the rivers and open streams from which the water now supplied to the metropolis and other large towns is drawn, is continually exposed.

The inquiry naturally took two distinct channels, one relating to the present water supply of London and other large towns, and the other to the merits of the several rival schemes for supplying the metropolis from completely different sources from the one now used, namely, the Thames and its tributaries.

We can only now touch upon one or two of the conclusions and recommendations to which the Royal Commissioners have committed themselves, after this extended inquiry. They pronounce Mr. Bateman's scheme to be "in an engineering point of view, feasible and practicable," but recommend "great caution in judging of the sufficiency of a gravitation scheme of such magnitude." The quality of the water would be, they say, "satisfactory as regards purity," but in point of softness and colour they consider that it might prove "less suitable for the supply of the metropolis than the harder water at present used." The cost of this scheme would, according to the evidence produced, be at least 11,000,000*l.*; and, if it be taken for granted that this estimate would not be exceeded, we are told that the cost to the metropolis of obtaining water by this scheme would be much greater than under the present system. The scheme would probably be opposed strongly in Parliament by the interests connected with the River Severn, and great local anxiety would be felt as to the formation of immense artificial reservoirs at the head of the Severn Valley. The same general remarks and objections are said to apply, in the main, to Messrs. Hemans and Hassard's scheme for supplying the metropolis from the Lake district; indeed, the Commissioners, in leaving this branch of the subject, express grave doubts "whether it is desirable that the metropolis should be dependent on one source of supply so far removed, and which might be liable to accidental interruption."

Having thus pronounced against the various projects for deriving the water-supply of London from a distance, it is easy to imagine that their deliberations have led them, not hastily, to conclude that the Thames basin affords the most natural and desirable source for the supply of the metropolis. The Commissioners are of opinion,—"That the river Thames, supplemented if necessary, by works for storing the flood waters, together with the river Lee, and the water obtainable from the chalk to the south and south-east of London, as well probably as from the Lower Greensand, will furnish a supply sufficient for any probable increase to the metropolitan population." These considerations have been arrived at by the evidence of the abundance, permanence, and regularity of the supply from this source, the supply streams of which are self-maintaining, and the collecting area of necessity much larger than any that could be made available on the gravitation system. As to the quality of the water supplied by the water companies, they pronounce that the weight of evidence is in favour of its generally good and wholesome character; that for drinking purposes it is quite unobjectionable, and in no way prejudicial to health, more especially as hard waters were in evidence declared to be more free from certain dangers inherent in soft waters, on account of their great solvent powers. The hardness, moreover, of the Thames water was said to be moderate in degree, and therefore not radically objectionable for cooking or washing purposes, while the proportion of the whole metropolitan supply used for manufacturing purposes was stated to be too small to render it necessary to go to a great distance for soft water. The Commissioners declare that perfect filtration is of the first importance to the good quality of the water supplied, and state that "this process is at present in many cases very imperfectly performed, and that more efficient means of enforcing the provisions of the law in this respect are required." They state, in conclusion, that "when efficient measures are adopted for excluding the sewage and other pollutions from the Thames, and the Lee, and their tributaries, and for ensuring perfect filtration, water taken from the present sources will be perfectly wholesome, and of suitable quality for the supply of the metropolis."

As to the quantity of water likely to be hereafter required for the supply of the metropolis, the Commissioners are of opinion that, even entertaining the possibility of an eventual increase of the population of London to between four and five millions, a supply equal to 200,000,000 gallons per day is the highest demand that need be reasonably provided for the metropolitan supply. It appears that the existing companies are prepared with only moderate additions to their present engineering means to supply a quantity little short of this amount.

The system of constant service is recommended for adoption to the farthest possible extent in the supply of the metropolis, and the Commissioners say that it "ought to be promptly introduced." Seeing that this cannot be effectually carried out "as long as the supply remains in the hands of private companies, to whom it would be inexpedient to confide the great powers

necessary for the purpose," the Commissioners are of opinion that "the future control of the water supply should be entrusted to a responsible public body, with powers conferred on them for the purchase and extension of the existing works, and for levying the rates," which would be necessary for the support of the system.

We hope on some future occasion to return to the discussion of one or two of the conclusions arrived at by the Royal Commissioners, which are in the main acceptable; but in concluding this brief notice of their report, we cannot refrain from expressing a regret that they have not declared an opinion as to the possibility of "excluding sewage and other pollutions from the Thames and the Lee, and their tributaries." It is on the very possibility of this supposition being carried into effect that the value of their conclusions and recommendations appears to us most essentially to depend.

THE ARTISTIC TREATMENT OF PIERS, PILLARS, AND COLUMNS.*

THROUGHOUT Gaul, the Roman colonies were very rich in buildings of public importance, with that amount of grandeur and decoration inseparable from such; but by far the greater part of them had vanished completely after the barbarian invasions to which the province fell a victim. Here and there, however, works remained to influence the new possessors of the soil when they at last turned their energies in this direction. But at best these Roman examples were rude, except, perhaps, in the extreme south, and taught little more than how to build well. In their details they displayed that ignorance of their models which betrayed their provincial origin, and it is well that thereby so much was left to the quick imagination of the new builders.

In their first attempts at building, the columns from the older edifices and ruins not being of sufficient strength to sustain the enormous weights which the badness of the work and the thickness of the wall necessitated, they first used them rather as ornamental accessories in the angles of the piers, and from this came the habit of using the angle shaft, so long a feature of early work. One of the best examples of this method is seen in the Baptistery of St. Jean at Poitiers, where all the principal projecting angles of the interior have a complete shaft, capital, and base, the shafts having the usual entasis imitated from the ancient models, with the fillet below the necking forming part of the shaft. But as soon as this mode of decorating the angles of the square pier became common, a less expensive and difficult arrangement had to be adopted, and we find the angle shaft built up with the rest of the work in regular courses. This rendered the setting out of the regular diminution too difficult for the ordinary workman, and it was omitted altogether in such a position. Another mode of using the column was by placing it against the face of the pier, to carry one or more orders of arches, somewhat after the fashion of the piers and pilasters under the arcades of Roman work. A fine typical example of this treatment is found in the cloisters of Le Puy Cathedral, and it is seen in this how the proportions of the shaft and capital have undergone modification by the new manner of building. The habit of forming much more solid piers to carry arcades has tended to make the old canons of proportion neglected. In this case the shafts are only about six diameters high, the capitals massive, and the bases very pronounced. These alterations in the size of the capital have been the result of a fusion of some of the members of the entablature with the abacus, and the result has been a capital apparently much more capable of doing its work than the model from which it was taken. If we analyse the parts we shall see how this has come to pass. In imitating the Roman cornices, or in constructing the broken fragments of a building of that style, we find that it was customary to omit the frieze altogether, putting the cornice itself directly on the abacus of the column. A good example of this is seen in the apse of the church of Alet, where all the parts are perfect, except the frieze, which is omitted. Throughout France and Germany numerous examples occur of this; and, as the cornice gradually became smaller, and more akin to a string marking the line of the arch-springing, the fusion became complete. But the abacus, though thus overpowered by the additions above it, was never lost, through all the best and purest examples of Gothic work in all countries, and may be easily separated, even where the two are formed out of one stone; and it will be generally found that the face of the abacus is in the same plane as the wall above. But this alteration of the Roman mode involved another important change. The great piers of built masonry where standing by themselves, or strengthened by the addition, as at Le Puy, of shafts, were crowned only by this string, and not by a capital; and thus we see the origin of so peculiar and, at that time, so unprecedented a treatment of capitals, as the circular ones in the cathedral of Carcassone. And this distinction between the piers and pillars is kept up through all the best periods of art, where the true capital is given only to the pillar, single or grouped.

Of the several orders employed by the Romans, only two came to be very distinctly imitated by the Romanesque builders; and although for a time each appeared likely to be the model on which all later examples would be founded, the more finished and lighter one gradually extinguished its rival. These two forms were the same, which, with different details, had for long been used side by side in each of the preceding styles, and which had in each played the same parts. They are best distinguished as the convex and the concave. With the Egyptians the early bud-shaped capital gave place to the full-blown flower; with the Greeks the Doric yielded to the Corinthian; and the rude, coarse Tuscan, under the Romans was soon displaced by the more finished and elegant Composite capital. And when the earlier builders in our own country and France commenced to work out for themselves that new style which was to contain the excellences of all the others, their first tentative efforts were directed to the enrichment of this form of capital, rather than to that other, which afterwards so well adapted itself to the more light and elegant details of the succeeding phases of the style. There is no doubt that when the revival in art first began there were numerous examples of Composite and Corinthian capitals found in the land for imitation; but they required more skill in the execution than the ruder forms of Roman Doric, especially as the details of that order were not nearly so finished as in Italian examples. In the Porta Nigra at Trèves, at Vienne, and other places, are specimens of the rough way in which it was worked, and which, although executed in the times of the Roman occupation, show most distinctly signs of the complete cushion capital.

Although, in many cases, it would seem that this form was roughly prepared in the stone and carved at later times, when the skill of the workmen had increased, it was more common in the richest examples to trust solely to colour as a relief to the bald and ungainly shape. Examples of this still remain at Rosheim, Jumièges, Moscow, and other places, while cushion capitals carved afterwards are frequently met with in our own country and abroad. After the custom of using these capitals was established and Romanesque architecture had arrived at a considerable degree of perfection, the ornament with which they were covered was always of a flat nature, generally running horizontally round the cap and not springing up from the necking, thus to a great extent betraying its origin in painted decoration. There is no doubt that this peculiar and heavy form of capital was admirably fitted for the part it played among the bold and massive details of Early Gothic, but that it was for this purpose specially invented, or evolved from the intersection of the cube and the hemisphere, is, I think, much less probable than the theory I have given. But that there may have been another cause is possible. It is not unlikely that many buildings had their capitals boasted out for the carving which there was not skill to execute, and these, left in the rough or eventually painted, might give the suggestion required. Eastern influence may have done more, especially in the south of France, where, not only the capitals, but so many other features, bear strong evidences of its presence. But, whatever the origin, whether an imitation of the coarse Roman models or a reflection of Sassanian art, or, still more improbable, the natural outcome of the necessities of the work, it is certain that for long the convex form of capital was common throughout Christendom, and it was only when it came to be fairly compared with the other model that it gradually gave way to its superior elegance.

There is a curious example at Notre Dame du Port, Clermont, where one of these rude Doric caps is placed side by side in the same pier, with a quite as rude copy of the Composite; and although both are as coarse as well can be, the superiority of the latter to the former is most marked. But in some of the more refined examples the carving goes very far to redeem the shape, and not a few in South France are as richly and elegantly carved as the best of Byzantine work, the influence of which is very apparent in such cases as Le Puy, Issoire, Brionde, &c. There is a point that Mr. Ruskin notices particularly about these early capitals, namely, that the line of carving in the convex ones is always sunk back from the face, while in the bell-shaped it is invariably applied to the curve; so that in all the best examples you will find that the carving of a capital will be bounded between two lines, concave and convex, and anything thrown out beyond becomes very emphatic, as the crocket angles of later French work, but liable, if overdone, to be coarse and unshapely.

In the imitation of Composite capitals there were few difficulties to get over beyond the mechanical one of the stone carving, and for awhile they contented themselves with copying anything they could get, until they had so far mastered the style as to have the confidence to make slight alterations in the arrangement of the foliage, and introduce fresh varieties. One of the earliest alterations was the simply dividing up the whole into leaves, placed as in their classic models, but omitting altogether the deep indentations and serrated outlines, giving a breadth of effect very telling when in close comparison, as is frequently the case, with capitals copied more exactly from the antique.

It is a noticeable feature in some of the great capitals of the simple cylindrical shafts, that where arranged round the apsidal end of a choir, their abaci were not unfrequently curved to follow the line of the processional path. This is very marked in the choir of S. Remi at Reims, and is seen in the bases of the piers of S. Bartholomew the Great, London.

The earlier forms of capital long survived another feature of classic origin, with which at first they were closely allied. The entasis early succumbed to the mechanical difficulties in the way of its construction, or the indifference of the builders, to a feature of such refinement. It was no easy matter for them to set out on the beds of stone the gradual decrease of the diameter, and thus the entasis came to be at first confined to the smaller monolithic shafts which could be easily turned in the lathe. Of these, good examples occur at S. Michel Le Puy and Gelnhausen and other parts of Germany. And when the habit of using the large circular piers without any bulge, became confirmed, the regard for the entasis died out, although the mechanical skill of the builders had much increased.

The decoration of the piers and columns was by no means confined to the capitals and bases in early work, and it is not unlikely that the habit of richly decorating their shafts tended to enhance the difficulty of using a diminishing column. Plenty of Roman examples remained to give the first idea for such work, and the simple channelled piers of La Charité sur Loire and Autun, as well as the richly-ornamented shafts of Le Puy, show how readily they took to the idea. In England, a common and not ungraceful mode of decoration for the great Norman piers was by incised chevrons or interlaced work, the examples of which are so well known from Durham and Waltham Abbey. One or two examples remain of an opposite treatment, but the peculiar specimen from S. Lawrence, Pittington, of a boldly projecting roll winding around the shaft is a warning that such decoration applied to a pier of any size would be most unfortunate.

The gradual disuse of these forms of applied decoration resulted from two causes,—the breaking up of the great piers into smaller grouped shafts, and the introduction of marble. The latter was a material too hard and altogether unfit for such a style of treatment, and was, therefore, left to its unassisted natural beauties, possibly heightened by polish. But this is, I hope, doubtful, in spite of the remains of fragments found at Salisbury and elsewhere worked to a considerable degree of polish. There can be, I think, but one opinion that the substitution of the mere mechanical work of polishing for the more artistic modes of decoration previously employed was a step in the wrong direction. And this for no abstract principle involved, but simply because this introduction of a material so unlike the rest of the work, in a position of such

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* By Mr. J. Tavenor Perry. See pp. 480 and 500, *ante*.

importance, tended to break up the mass to the extent of weakening the appearance of support, and detract from the very assurance of strength it was intended to inspire. The effect of a series of highly-polished dark marble shafts let in the angles of piers and windows is at first rather that of deep vacancies than supports, and much less happy than where the simple gray tint of unpolished marble harmonises with the rest of the building, as in Westmir ster Abbey. The love of breadth, or the absence of materials, preserved the great churches of France from suffering by these violent contrasts; but to this day our love for strong marbles is only equalled by our excessive admiration for plate glass and French polish.

A few cases remain where painted decoration has been happily employed on the columns. One of the best of these is in the north transept of the church of Our Lady of Charity, Faversham, where an octagonal Early English shaft has a series of figure-subjects ranged round it in bands, much in the same way as found in Egyptian temples and Russian churches.

The breaking up of the great piers into grouped shafts was brought about chiefly by the alterations and advancement made in the roofing great spaces, and thus still further concentrating the weight and thrust upon particular points, requiring their reinforcement by increase of bulk or compactness. The very common mode of covering the naves of the churches by wooden roof, carried on stone arches crossing at intervals, and dividing them into bays, caused the alternate piers to be much thicker, and necessitated the vaulting shaft carried up the whole height of the church, and resting on or grouped below with the piers of the nave arcade. This introduction of the vaulting-shaft in the nave led the way for that admirable arrangement of colonnettes which became so usual throughout all pure Gothic times, and which allotted to each rib of the vaulting or arch of the arcade its particular means of support, and grouped them around some main pier that carried a large proportion of the superincumbent weight.

The new arrangement caused many further modifications in the details. The capitals of these smaller shafts were, to a great extent, made independent of the capital of the larger pier. The super-abacus as a rule mitred round all alike, but the capital itself was generally made deeper in the large pier than to the small surrounding columns. Examples of this are to be found in many of the French cathedrals, as well as at Chichester, Salisbury, &c., in our own country. But at Chichester the mouldings of the super-abaci, as well as of the bases, are of different sections, and intersect in a manner less happy than peculiar. This difference in the heights of the capitals was not at first, perhaps, altogether the result of intentional regard for proportion, although in the result so fortunate. The upper bed of the stone which was of the depth of the smaller capitals, was generally of one stone, to form, with the super-abacus above, at once a tie to all the parts of the pier, and a means of evenly distributing the pressure over the whole. The horizontal joint which this necessitated across the carving of the great capital frequently suggested a charming treatment. A curious example of how important the Mediævalists regarded the distribution of the pressure over their grouped shafts, and the necessity for a medium capable of the task is seen at Salisbury, where is introduced an abacus made of bronze. This is in the centre of the west front, and it may have been thought that the great weight to be carried rendered an abacus so deeply undercut as are those of the Early English period liable to flake off in a material of less coherence.

The treatment of the abacus differed very materially in England and France. In the latter the much more common use of vaulting had the effect on the abacus of defining much more exactly its shape, which followed accurately the general outline of the mouldings or shafts placed upon it, and the arrangement of the foliage below was so regarded as to enhance the effect of strength given to the point on which there was the appearance of the greatest pressure. Add to this the depth given to it, and the simple bold mouldings formed on its edge, and we see that it is little wonder that it so favourably contrasts with the weak and liney effect of our own Early English examples. With us, however, the form of the abacus, as a rule, followed that of the shaft beneath, whether in single or grouped examples, until the circular form of capital became so established that piers, which are either square or octagonal in their arrangement, not unfrequently had above them circular abaci. Those of St. Hilda, Hartlepool, are good examples of this peculiarity, where the forms are very varied, being sometimes grouped shafts, and sometimes compound piers, but in all cases the abacus is simply a circular stone, fitting neither the square bold plan of the mouldings above nor the piers below. Compare to these the very similar piers from S. Étienne, Beauvais, and you will see how much the English example loses by its want of appropriateness in this respect. At the east end of Chichester are some similarly treated piers, where a circular abacus is placed in the same manner, over three shafts, standing wide apart, and only united at the cap and base. Numerous exceptions to this occur, as at Canterbury, Stamford, All Saints, Staughton Parva, &c., which it is impossible in a paper like this to particularize, although the examples are very interesting. In England a great alteration in the character of the foliage was the natural result of this change of the form of the abacus, as the antique mode would not readily adapt itself to the much altered circumstances. Here, too, we never had the numerous models of ancient sculpture for imitation, and our masons did not so early arrive at that perfection of carving which characterized the work of French artists. There were, thus, fewer trammels to hold us to that form which so peculiarly points to a classic origin; and this perhaps is scarcely a matter for regret, for although later in the field, and much more rarely called upon to produce works so grandly monumental, our sculptors attained a very high degree of excellence, and showed, in their treatment of the capital at least, more variety and imagination than their neighbours. The graceful and strange animal forms frequently introduced gave life and vigour to the whole, and made such works as those in the chapel of the Nine Altars, Durham, comparable with the best efforts of any age or country. On the other hand, the boldness of the crockets with which the French emphasised their angles and heavily weighted points, often became, from mere frequency of iteration, wanting in that piquancy which at first appears so striking, while the constant change and delicate beauty of the early English foliage are never monotonous or tiring.

Another new and important feature here first introduced to us is the band. While the whole mass of the pier was built in regular courses of masonry extending through the whole breadth, no other bond was required; but directly the smaller shafts, formed of different materials and of different density, were introduced, some tie capable of holding together the various parts became necessary. The plan already suggested by the treatment of the abaci gave sufficient suggestion, and like them the bands were usually nothing more than plates of stone, moulded on the edge, going throughout the pier or respond, holding the whole together or to the wall. In our own country we have one or two metal examples. At Salisbury they are simply hoops of bronze, with long hooked ties connected therewith, which were built up in the courses of the central shaft. The copper bands at Westminster are even better known. The stone bands across the wall shafts of Noyon and Laon cathedrals form remarkable features in these buildings, and are useful otherwise than for the construction, by marking more particularly the graceful proportions existing between the central and side shafts. At Noyon the bands are 7 in. deep, and occur every 4 ft. or 5 ft. At Chichester, where some of the wall shafts project a considerable distance from the wall, a long tie of Purbeck marble, well bonded into the wall and elaborately wrought with foliage at the sides, is worked into a moulded band on the face. The necessity of the bands is shown in some cases where they have been omitted. In that rather peculiar and beautiful Early English church at Hythe are several examples of Purbeck shafts, 4 in. or 5 in. thick, which have been bent from their own incapacity to bear the weight above without lateral support. This, too, may be seen in the porches of St. Alban's Abbey, where are several specimens of the peculiar way in which Purbeck shafts will sometimes yield and laminate if not put up bedways. Where bands are used they are generally evenly spaced, as any irregularity is likely to give an appearance of distortion to the pier; but in some cases, where near the eye, and where the unequal spacing is too marked to appear anything but intentional, the effect is good, as at S. Julian Brionde, where a band is used at about a third the height of the shaft. The bands were not used only for the purpose of holding several shafts together, but were often placed in the centre of a single shaft, when that was built in in two or more large stones, as at St. Peter's, Northampton, where there is a richly-ornamented deep band introduced. As the style advanced and the separate shafts became gradually so united with the main piers as to allow of the whole being built up together in ordinary masonry, the absolute need for bands disappeared, and we find the great clustered shafts of Bourges and Le Mans rising their whole height without any break whatever; and it is a question, had they been cut up with bands as were the smaller piers at Noyon, if they would ever have had the grand and monumental effect they now present.

There is no feature connected with our subject of more variety and delicateness of execution than the base, and yet there is none in which the original model was so well preserved in all countries and through all ages. The Attic base from which the earlier Romanesque bases were copied, became in the hands of the Gothic builders more refined in its outline, with more deeply-cut hollows to throw out in strong relief the delicate fillets which bounded them, and which were set at such angles as would reflect the greatest light. The lower roll in the great bases becomes very pronounced, and, at times, the hollow was enriched with carved ornament. In Continental work the base was generally raised higher than in our own, and exhibits a much more carefully thought out section than ours, although we have more members in a base of the same size. The bringing the base nearer the eye required that more attention should be devoted to its refinement and fitness than would be the case with other mouldings, and we find in them all the delicacy and finish of the finest Greek work mixed with that boldness of shadow and sharpness of outline so characteristic of Northern Gothic. Although our base differed from the French in none of its general arrangements, there was one matter of detail modified by slight differences of treatment. The hollow between the rolls being nearer the eye in the French example, the upper half of the shade in the hollow would be sufficiently seen to give the relief required, but with us the frequent absence of defined shadows, and the lower position of the base caused the hollow to be cut down to such a depth and in such a manner as to hold the water and moss.

The manner of raising the bases on high plinths, so common on the Continent, is very superior to the classic models suggesting the idea. The heavy mouldings which, in the antique examples, crown the plinth are here omitted, and the base mouldings form a graceful and gradual junction between the plinth—the true constructive base—and the shaft. The plinth, following the abacus, was generally angular in shape, and the expedients resorted to for hiding the exposed corners resulted in the introduction of the Claw. This is to be found in all Early Gothic work of most clever and appropriate designs, and it seems a pity that a feature so elegant should, by the rounding of the bases, and omitting the plinths, have gradually fallen into disuse in England. The plinths were frequently reduced to their smallest size possible with good construction, especially as the style progressed, and the lower roll of the base allowed to project considerably beyond the plinth. And this effect was often further enhanced by chamfering so much of the upper edge of the plinth as was left exposed, and stopping the chamfer square under the base, as in the choir of St. Hilda, Hartlepool, and commonly throughout France; while in S. Cyr, Nevers, they have gone to the extent of placing a small corbel under the projecting moulding, thus appearing to carry the weight.

Plinths came much more into use in the later styles of our own country, but rather on account of the introduction of benches into our churches than from any felt constructive necessity.

It will be unnecessary to pursue further our subject in the later periods of the Gothic and Revival, as I sought only, when commencing this paper, to trace the various features from their birth to their perfection; and, although instructive, it would be scarcely interesting to follow it, step by step, to its end and degradation. In the country, where, perhaps, the column was brought to its most perfect form and proportions, it was reduced to its most meaningless deformity. Side by side in Senlis Cathedral you may see columns rivalling the purest Doric for grandeur, and the

most delicate Corinthian for refinement, with those meaningless abortions so common in Flamboyant work, wanting in all the essentials of a column, and looking like nothing so much as petrified barley-sugar.

In briefly concluding this paper, I would just indicate one or two of the most important points to be learned from the subject. The complete column, as used in the best periods of art, was the natural outcome of the wants of the builders, and no detail or feature was suffered to be present merely for its æsthetic value. No ornament applied was in any way allowed to interfere with its constructive value, and weaken its apparent strength. But it too often happens now that a capital is only introduced as a means of showing off badly copied carving, or to be, as defined by our chief Architectural Dictionary, merely an ornamentental finish to the top of a column. The construction of the pier must depend entirely on the materials in reach, but it should always convey an idea of strength and ability to sustain the super-imposed load, and should therefore be one of the last members to receive decoration. But just now, unfortunately, there is a fashion of employing richly-veined shafts to support ungainly capitals of twice their height, mere lumps of meretricious ornament introduced at the expense of solidity, or to cover a want of taste and proportion. Granite columns bearing cement entablatures and polished marble shafts, corbelled out to carry exaggerated dripstones, are features not uncommon in City forms of Victorian architecture; while, if a model at the South Kensington Museum is correct, it may yet be our fate to see grouped shafts "after the Gothic manner," with a regular entasis, looking like a stack of hop-poles trusting to one another for support, and as incapable of sustaining any weight. But a slight acquaintance with the best examples of the past would prevent the occurrence of such anomalies, and I have therefore presumed in so long a paper to give such an historical account of the whole matter as might clearly show the leading principles which guided architects in their treatment of this feature through all the best periods of our art.

WIRE TRAMWAYS.

ALTHOUGH the railway system is now in its fourth decade, we are still in the habit of drawing comparisons between its speed and comfort and the days when the performance of a coach journey between London and York was thought no common feat. Yet this very mode of transit was a sharer, to a large extent, in those obstacles which always present themselves to all new inventions—obstacles which, while distasteful to originators of new schemes, are not without conspicuous advantages, inasmuch as they serve to test, in a tolerably conclusive manner, the real merit of each new invention presented to the public.

No inventions are more likely to contribute to the welfare of mankind than those tending to promote and increase the facilities for intercommunication between different places, which adds to man's power to render himself *en rapport* with his fellow man or which enables him to transmit the produce of his land, whether vegetable or mineral, at a moderate expense to the point where a want for such produce exists. It is well known that one chief obstacle to the advancement of many, if not of all, our colonies, is the difficulty of transmitting the produce raised or manufactured by the settlers to a market at such a moderate expense as will admit of a profitable business being transacted alike by the buyer and the vendor. In numerous instances mines otherwise valuable at present remain useless to their owners, although in many cases but a moderate distance from a railway station, simply from the excessive expense of any arrangement hitherto available for transporting their produce, in consequence of the obstacles which present themselves to the construction of any roadway.

The present railway system has, however pardoxical the statement may seem, in one sense fought against itself. It is during the days of its infancy it has been decidedly an expensive system. The laws of physics were studied by early engineers to the neglect of those of commerce, the result being that while in certain districts we have unprecedented facilities for travelling or transmitting our goods, yet we find our railways are not profitable, nor is the system so generally applicable to all exigencies as to render it anything like generally available for all purposes of transit. In a word, a railway, to realise even a moderate profit, can only be made where there is a large general traffic, and considerable natural facilities for its construction. Such a system as this is useless to transmit the produce of some quarry or mine of value, but which is surrounded by a rugged country abounding with ravines and precipices.

There is a mode of transit which has been practised in India and Australia by means of a rope stretched from point to point, but which as yet has been only what may be called a local arrangement used principally for bridging rivers or ravines. A scheme has lately been brought before the public which proposes an extension of this arrangement, and to apply it to the transmission of goods over long distances through countries where the ordinary railroad, from the reasons already stated, is inapplicable. The system known as the wire tramway is an attempt to convey goods over natural obstacles at so moderate an expense as to render it possible to profitably work collieries, mines, quarries, &c., situated in wild or mountainous places. The scheme is still comparatively in its infancy, and is capable of much development, but the essence of the plan is perfect, and a wire tramway—as it is called by the inventor—is already in actual practical operation, a line of three miles being successfully worked in Leicestershire at this moment. It runs from some granite quarries—the property of Messrs. Ellis & Everard—at Markfield to Bardon, a station on a branch of the Midland Railway. The line is conveying stone from the quarries to a powerful crushing-machine at Bardon, to be broken for road-metal. The line has been constructed to carry 100 tons a day, but has never as yet been worked to its full powers. It is actuated by a double-cylinder portable engine of sixteen-horse power, but which, like the tramway, is not nearly fully worked.

The nature of the scheme is simple, and has been already briefly described in these columns. It may not be useless, however, to recur to it. To suspend a weight from a rope supported by a post at either end would seem simple enough; to move the rope with such load would likewise appear easy to accomplish; but to cause the load to pass the post is another matter, but yet one that a little reflection will show can be managed without difficulty. The rope passes twice over the ground in one of the modes of arrangement, being, in fact, an endless belt passing at one end of the line round a Fowler's clip-drum, and at the other round a large pulley, or wheel, with a deep groove in the rim. The rope between the termini is supported on posts of any reasonable height, resting at these points on small wheels grooved in the rims, to prevent the rope slipping from them. On motion being communicated to the clip-drum, the rope moves also at the same speed as the periphery of the drum, of course. Any weight hung on the rope will move with it, and supposing the weight to be able to clear the posts it will move from end to end of the line, and were it not for the drums at the ends would move continuously; indeed, by proper arrangement and formation of the hooks, they would pass round these, and then the load would move continuously if required. The posts which support the rope are placed midway between the up and the down line of rope, and have at their upper extremities cross bars, at whose ends the grooved wheels are placed at such distance from the upright as to bring them in a line with the rope; these wheels act as friction rollers, and rotate as the rope moves.

The rolling stock, if we may call it so, consists of a number of boxes, each of which is provided with two iron hooks lined, where they rest on the rope, with wood; the shape of these hooks is the method whereby the boxes pass the posts. At the place where they hang on the rope they are simply hooks; a little below the rope, however, they spring back with a curve, similar to that of the bar which suspends the flat pan or plate used for weighing butter, &c., by cheesemongers. This curve leads the hook or hanger clear of the wheel supporting the rope, and when quite below, it bends in horizontally, and supports the box which thus hangs below the wheel, its centre of gravity coinciding with the centre of the rope. When the rope moves the box moves, and the depth of the groove in the supporting wheel being but little in excess of the diameter of the rope, and the wood liners of the hooks being suitably curved, they pass gently up on the edge of the wheel and down the other side to the rope again, without perceptible jerk of any kind. From the foregoing it will be obvious that so long as the supports and rope are of sufficient strength to sustain the load and the hauling power adequate, any given load may be transported from place to place without difficulty. The boxes will hang true, irrespective of the shape of the hangers connecting them with the rope, so long as the centre of gravity is kept in a proper line.

The question of curves may be dealt with in a variety of ways. The plan at present adopted at the Markfield and Bardon line is a series of wheels set with their axes at an angle both with the horizon and also with each other, so that they would, if produced, meet in one common point, whose distance from the wheels would be proportionate to the rapidity of the curve. The number of wheels varies with the amount of alteration of the direction of the rope that is found necessary. The arrangement at the unloading end of the Bardon line is simply a light angle iron, curved round the same centre as that of the clip drum, save that it is farther away from the latter, in the opposite direction to the line of rope. This angle runs parallel with rope for 2 ft. or 3 ft., and at the incoming side, curves gently up higher for a short distance, and then inclines all round to its other extremity, which is a little below the rope level. The hangers of the boxes are each fitted with a little grooved trunnion, and as each box comes to the angle iron, these trunnions pass on to it, and the impetus of the box causes it to run the trunnions up the angle iron, thereby lifting the hooks from the rope, and it then has the falling incline, down which it runs to an attendant, who upsets the box over a railway truck standing beneath, and when empty allows it to pursue its course along the angle iron till it rolls gently on to the rope, to pursue its way back to the quarry at Markfield, where a somewhat similar arrangement is provided, the boxes being there shunted by hand to be loaded. These arrangements are all capable of sundry modifications.

The general dimensions of the details of the Bardon line are as follow:—The posts are from 10 ft. to 12 ft. high; the carrying wheels are 15 in. diameter on the bottom of the groove; the posts are about 150 ft. apart, with one exception, where it was found necessary to place them 600 ft. apart; the two supports here are about 40 ft. in height. The clip-drum is 4 ft. 6 in. diameter; the distance between the up and the down line being also 4 ft. 6 in. The rope is a wire one, 1¼ in. in circumference. The speed of the boxes is about four miles an hour, though this may be considerably exceeded. The boxes carry about 1 cwt. of stone, when loaded.

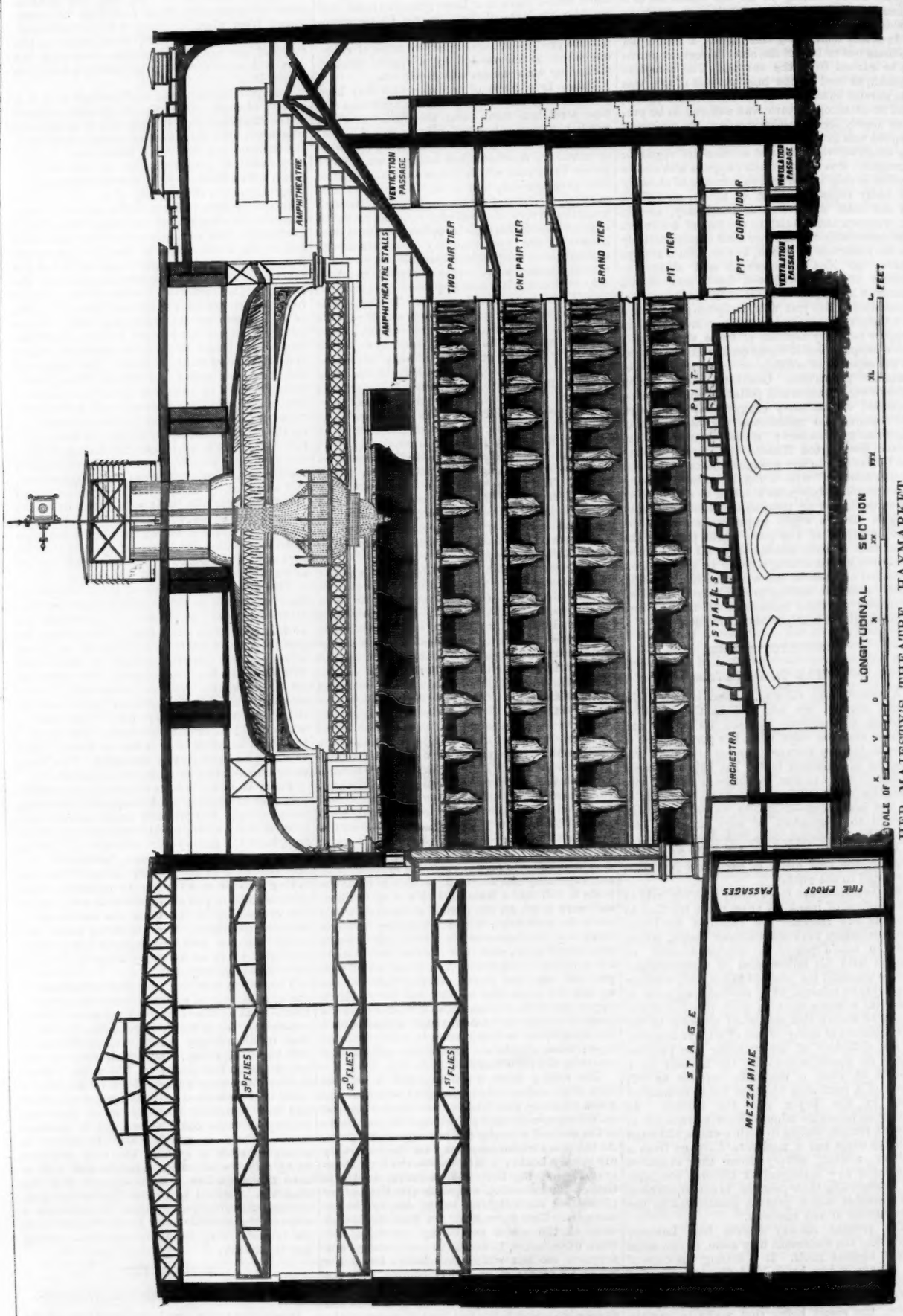
There is much reason to anticipate that the principle of moving loads, especially minerals, along a rope, will prove of much value to contractors or others engaged in erecting large buildings, from the facility with which a line can be constructed between quarries, brickfields, &c., and the scene of operations. Large structures, taking two or more years to complete, could have their lines put up at moderate cost, and on the completion of the work the line could be removed elsewhere. The contractor could have either his own post and rope, or hire so many thousand yards or so many miles of line, for such time as he required.

The employment of the system promises, too, the development of mines hitherto either unprofitable or altogether unworked for want of cheap transport. In a word, it promises to supply that which ordinary railways do not furnish, a line portable, cheap, and which may be any length from 100 yards to 100 miles. Some doubts have been expressed as to whether it could ever be worked on the system of a main line and branches, whereby more than one colliery or mine could be worked at the same time. There is no difficulty whatever in arranging such a system, the only requisite being suitable shunting arrangements and to have the main line a little stronger than the branches. Colliery proprietors and others possessing mineral property appear to entertain a sense of the probable value of the scheme from the inquiries they have hitherto been making into the matter.

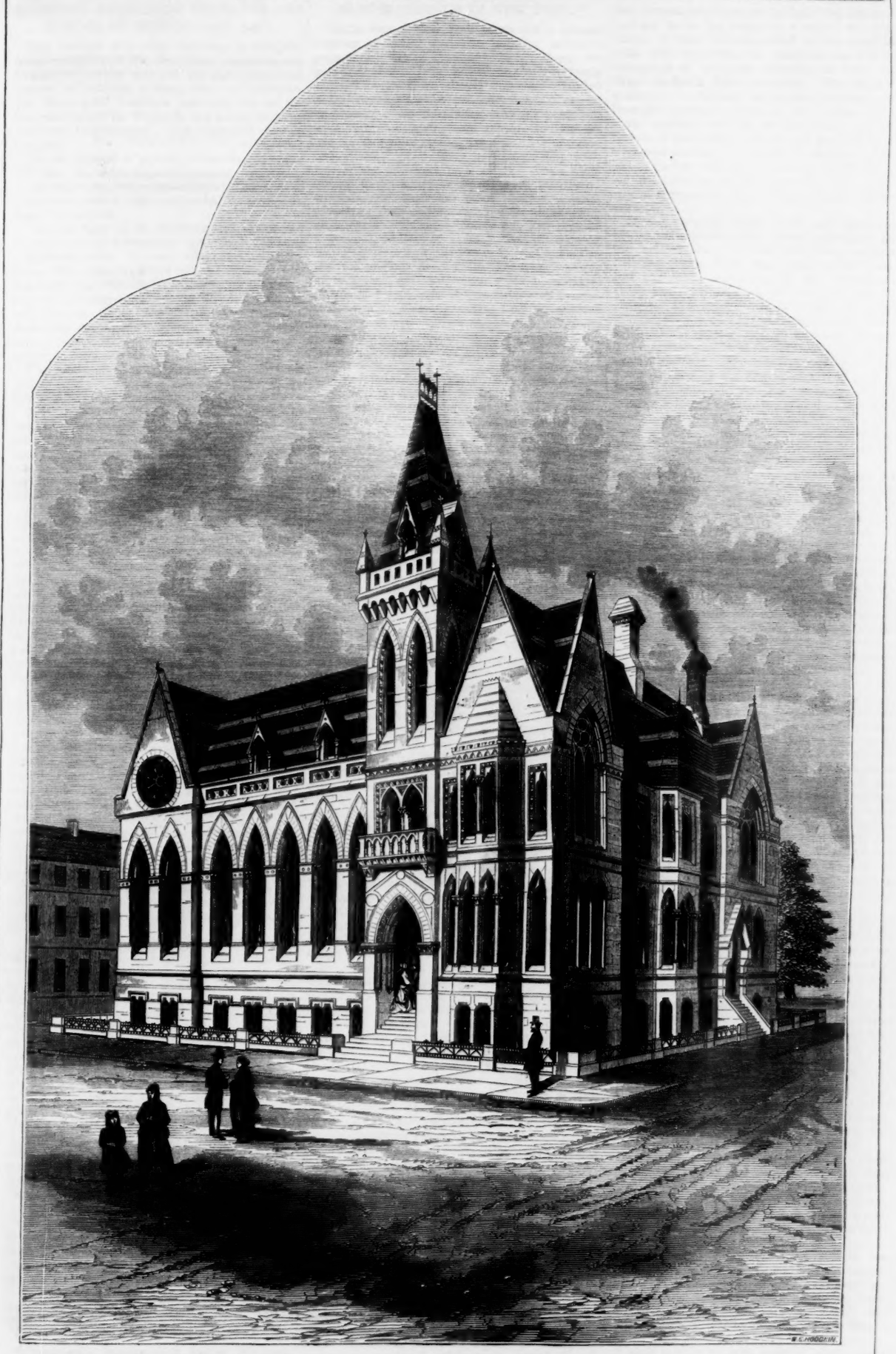
HER MAJESTY'S THEATRE, LONDON.

IN addition to the previous illustrations of the new theatre in the Haymarket, we give in our present number a Longitudinal Section of the building.*

* See pp. 508, 509, *ante*; and vol. xxvi., pp. 911, 912.



HER MAJESTY'S THEATRE, HAYMARKET.



MECHANICS' INSTITUTE AND SCHOOL OF SCIENCE AND ART, KEIGHLEY, YORKSHIRE.

MESSRS. LOCKWOOD & MAWSON, ARCHITECTS.

KEIGHLEY MECHANICS' INSTITUTE AND SCHOOL OF SCIENCE AND ART.

THE erection of a large building for the joint accommodation of the Mechanics' Institute and School of Science and Art has just been commenced at Keighley, a rising town in Yorkshire. The Mechanics' Institute here was one of the first established in England, and a new building has been long wanted. This want will now be supplied.

On the ground or principal floor the Institute will have its more important rooms; consisting of reading-room, conversation-room, library, room for patents, and a large lecture-hall to accommodate 700 persons.

The first floor of the building will be devoted to the School of Science and Art, which will have a handsome suite of rooms adapted to its purpose. The painting-room will be lighted from the north; and the exhibition-room, for the drawings of the students, will be 46 ft. by 22 ft., with lantern light. Elementary drawing-room, modelling and casting rooms, master's rooms, and separate retiring-rooms and lavatories are arranged upon this floor.

The basement floor is occupied by class-rooms and curator's rooms; and from the nature of the site this story is clear of the ground on all sides.

The entrances are so arranged that the mechanics' institute, the lecture-hall, and the school of art may each be in operation at the same time without interference with each other. All the rooms are lofty and well ventilated, and will be warmed by open fireplaces and by hot water.

Externally, the building will be Gothic in style, built entirely of stone, with ashlar quoins and dressings. It is placed at the angle formed by the Skipton-road and Cavendish-street, and will be a conspicuous addition to the public buildings of the town. The funds for its erection have been raised by subscription, and the principal contributor is the Duke of Devonshire. The cost will be about 12,000*l*. The architects are Messrs. Lockwood & Mawson, of Bradford and London, who are also erecting large new baths and washhouses for the town in the immediate neighbourhood.

In addition to the accommodation afforded for the higher branches of science and art teaching, there will also be rooms provided for the more primary and elementary education of workingmen who have not had the advantage of attending school in youth. A too numerous class of such men still exists, and their delicacy of feeling is such that they cannot be persuaded in any numbers to attend the primary night classes usually monopolised by, and devoted to, the teaching of boys; and this accommodation is specially provided with separate rooms and entrances, &c., as an inducement to such persons.

There will be similar accommodation for female teaching, and it is expected that in both these branches advantage will be largely taken of it.

From this short description it will be seen that the Institution is designed as an industrial college for the Keighley district. The plan of operations under the consideration of the directors seems commendable. It is suggested that a school be established, upon the Bristol model, in the rooms allotted to the school of science, and that, in combination with the evening classes and the school of art, a complete system of instruction in science and art be organised. It needs not be pointed out how readily this scheme will be available for the whole of the district. At Bingley, Saltaire, Skipton, Wilsden, and Cottingley ordinary evening science classes are either in operation or will be established prior to the ensuing autumnal session. From these classes the most successful students can be passed on to the more advanced instruction that can be given at the Keighley Institute, while the distance from the trade school is not great enough to prevent the daily attendance of lads whose parents desire for them a higher education than can be obtained in the day-schools of the respective townships. Let what is proposed to be done at Keighley be done in every centre of industry, and English mechanics will have no right to complain of want of opportunities.

Waterproof Paper. — A patent has been obtained in America for the manufacture of water-proof paper. It will be no uncommon thing, by and by, to carry a quart of milk home in a paper bag!

IRON BUILDINGS IN NEW YORK.*

IN the city of New York there are a greater number of entire cast-iron building fronts in process of erection than ever before at any one period of time. Iron, indeed, has meritoriously secured for itself an almost universal adoption in this country for the first-story fronts of stores, on account of its durability, strength combined with lightness, and ready renovation; but its use for complete fronts, for a number of years immediately past, has, in comparison with marble and freestone, been small. When, some twenty years ago, iron fronts were introduced as a novelty, their low price secured a large adoption; but, incorporated with these early attempts were defects which in due time secured a general dislike to them. The introducing manufacturers and architects in iron, acting on the self-evident proposition that a multiplicity of ornament and decoration could be executed in iron at an expense not to be named in comparison with that of stone, literally covered their fronts with useless filagree work. Every column must be fluted or of some intricate pattern, every moulding enriched. Wherever a square foot of plain surface revealed itself, that was deemed a legitimate place for elaboration. The carvings high up in the air, on the fifth story, were the same as those low down on the first,—no bolder,—and in every case too flat and fine. Instead of seeking for beautiful outlines and proportions, and appropriately embellishing special features, to contrast with other portions of the edifice, purposely left plain and unpretending, with ironworkers' ornateness was made the governing idea; and an elaboration, such as architects previously might have dreamed of, but did not dare represent in their plans, produced, with twistings and contortions of outline and crowding in of small columns and pilasters and diminutive friezes and cornices, overlaying everything with so-called ornament, and planting on miles of reiterated and unmeaning rope mouldings,—all this was presented as embodying the beautiful, and as a thing which would greatly elevate the public taste. But the pretensions and vulgarity of these over-ornamented fronts, in due time, brought them into well-merited contempt, and sealed their condemnation by every person who had any knowledge at all of what is truthful and comely in architecture.

The fault of these fronts was not in the material employed, but in the false treatment. Mistakes occurred in the use of cast-iron from its unskilful disposal; and the material was judged more by the mistakes made by the unskilful, than by its capabilities for proper application.

For building purposes, cast-iron possesses unequalled advantages of strength, durability, economy, and adaptability to ornament and decoration. In resisting any kind of strain, it is vastly superior to granite, marble, freestone, or brick. Practically, cast-iron is crushing-proof, for a column must be ten miles in height before it will crush itself by its own weight. Unlike wrought-iron and steel, it is not subject to rapid oxidation and decay by exposure to the atmosphere; and whatever tendency it may have in that direction, can easily be prevented by a proper coating of paint. No other material is so valuable after it has served its original purposes, as it may be recast into new forms, and adapted to new uses.

In business quarters, where blocks of stores are built up solid, where each building measures about 100 ft. deep by 25 ft. wide, rear almost butting to rear, with window openings only at the front and back, light becomes one of the most important requirements. An airy edifice of iron may be safely substituted for the cumbrous structures of other substances, and ample strength secured, without the exclusion of daylight. Iron, in this respect, presents peculiar fitness. It wants proper treatment, and asks not to be set up as a false jewel, coloured and sanded in imitation of stone, or made flashy with over-ornamentation. This material—emphatically an *American* building material—has peculiarities of its own, and will preserve its own individuality. If the ancient examples of cornices and capitals, and mouldings generally, which have stood the test of criticism and been judged correct, are deemed best for stone, then they are best for iron also, and an attempt to inaugurate new styles of architecture should bring a frown as quick when in iron as in stone. Whatever moulding is good in stone, or projection, or general outline, is also good in iron. And iron, with its greater daylight openings, and airiness of structure, will proudly speak for itself. But correct outlines must be faithfully followed; and can be in the hands of a skilful manufacturer. If error be committed by the unskilful, it no more condemns the material than will the thousands of ludicrous mistakes in wood and stone condemn those materials. The ancients worked in stone, and artistically produced outlines that perhaps never can be rivalled. Iron is the modern building material, dug from the bowels of the earth, smelted and purified by an advanced science, and ready to supplant stone, just as history relates stone supplanted mud in the construction of dwellings for men. Each tells of a growth in knowledge applying a better material.

In this country, where stone and brick are scarce and expensive, and where prejudices are less settled than in older countries, cast-iron building fronts have crept into public favour and confidence more rapidly than elsewhere. Much has been said against iron from misconception. It is exceedingly difficult in the minds of most writers who use sweeping denunciations and citations against iron, to separate wrought iron and cast iron in their respective endurance against weather. Wrought-iron rapidly oxidizes when exposed to the atmosphere, and goes to decay. Cast-iron, on the contrary, slowly oxidizes in damp situations; rust does not scale from it, and the oxidation, when formed, is of a much less dangerous kind than on wrought-iron. A coating of paint will counteract whatever tendency cast-iron has to rust when exposed.

A great deal has been written about the colour to paint ironwork. Iron being a material which requires a coating of lead and oil, it is meet and proper to give it any colour that good taste may suggest. The colour will often be regulated by the character and hue of adjoining buildings or other surroundings. Because marble is white or sandstone brown, the painting of ironwork in these colours must not be prohibited. What is to be condemned is the graining of iron in imitation of marble, and sanding in imitation of stone. Wherever practicable, iron work should be painted inside as well as out. Particular care in this respect should be given to window lintels and sills, so that if rain-water gets in behind and trickles down the face of the building, there will be no streaks of rust to tell of carelessness, or of the entire omission of an inside coating. All iron work put together in pieces, as cornices, trusses, &c., should have their joints well painted before being bolted or riveted together. In applying ornaments to iron, such as leaves of capitals, &c., not only should the ornaments themselves be first thoroughly painted, but the screws which fasten them to the main work should be dipped in white lead or paint. After drilling a hole in iron the burs around the hole should always be filed away. A lack of care in these little matters often causes the greatest annoyance. For the first coating of iron nothing is superior to oxide of iron mixed with oil, or what is known as metallic paint.

Long after a stone front has gone to decay and disappeared, the iron will be retained in its original fulness and sharpness in every line. Keep it painted; and, after a thousand years of exposure to wind and weather, an iron front will be as perfect as on the day of erection. To paint iron costs much less than to paint wood or other materials, on account of its non-absorbent surface. The interest on the difference in first cost between a stone and an iron front will easily pay for painting. More than that: allow the difference in cost to accumulate with legal interest, less the expense of two coats of paint every three years, and, by the time the stone is ruined, the iron will not only have cleared itself, and stand on the balance-sheet at a profit, but be in prime condition for continued service.

On any much-travelled street, a marble front soon becomes rusty and discoloured with dust and rain. An iron front, kept properly painted, appears periodically in a new dress, and is always clean and bright. Other things being equal, place two merchants respectively in a stone front and an iron front store, side by side, and he in the clean, bright, attractive front will do the most business, and can afford to pay the largest rent. Just above Grace Church, on Broadway, there are two stores erecting, adjoining each other, and precisely alike in every detail, one front of iron and one of marble. These take a place in the history of building fronts.

A plain surface in iron, however, shows quite different from that of stone. The preserving coat of lead and oil gives to iron a glare and extreme smoothness of surface that is annoying and hurtful to the sight in reflecting the sun's

* By Wm. J. Fryer, jun., Constructor in Iron.

rays. Painting, too, reveals the unevenness and imperfections of the casting in a magnified degree, particularly when the sun's rays strike it at certain angles. On stone surfaces, after being made level and true with the chisel, there is still a grain and a slight but regular roughness of surface which prevents a glaring reflection. By a simple but very effectual process—that of casting the plain surfaces of iron with a fine cord running vertically—the shafts of columns, and ashlars, and lintels, &c., are given that charm of chiaroscuro which, by its delicate play of light and shadows, makes it soft and pleasant to the eye. This fine crimping destroys the effect of the usual and ordinarily unavoidable unevenness in the surface of castings, and in effect makes iron altogether more nearly to resemble stone.

When iron fronts were first introduced it was strenuously asserted by some, that expansion and contraction would dislocate the joints, and render a building unsafe. An examination of any of the numerous cast-iron structures, which, for a number of years, have been exposed to every change of atmospheric temperature without, and to the heat of steam-boilers, &c., within, will show everything unchanged. This proves that the temperature of our climate, throughout its utmost range, from the greatest cold to the greatest heat, exerts upon it no appreciable effect. Events have also proved, in the cases of the burning of store-houses, filled with combustible goods, that cast-iron fronts are absolutely fireproof, and will neither warp, nor crack, nor fall down. Only let it be remembered that, in addition to a high and intense heat, the use of a blast is required to reduce iron to a molten state, and the ability of iron fronts to withstand fire will be readily understood. They are also perfectly safe during thunder-storms. The metal, presenting so great a mass to the over-charged clouds, becomes a huge conductor in itself, and silently conveys all the electricity to the earth. In them, the intensity current is instantly diffused throughout the entire mass, and changed into a current of quantity, thus obviating all danger from disruptive discharges.

A front of iron can be previously prepared and fitted in the manufactory, and thence safely transported to the place of erection and put together with wonderful rapidity, and at all seasons of the year. It takes up less space than a stone front with brick backing, and so enlarges the interior of a building. When it becomes desirable to tear down the building itself, to make way for other improvements, the iron front may be taken to pieces, without injury to any of its parts, and be re-erected elsewhere, with the same perfection as at first. Instead of destruction, there would be removal only. In iron, as in other materials, must ever be observed those undeviating laws of proportion, and rules deduced from a refined analysis of what is suitable in the highest degree to the end proposed. There is not a structure erected anywhere, but adds its quantum to the good or bad impressions to be directly stamped upon the public mind. Thus every one who builds is unwittingly enhancing, or deteriorating, the taste of the masses; and the aggregate result of this is a thing not to be over-estimated. It behoves the general use and careful treatment of a material which allows greater architectural effect, in proportion to the outlay of money, than any other. In our new and growing country, the dollars saved on one building are required for the erection of another, or for use in railroad, or mining, or manufacturing enterprises. It is primarily a duty for every builder to do the most with his money and the most for art.

On the manufacturer depends the artistic appearance of an iron building as well as its durability. The material is capable of receiving the sharpest kind of lines. But to secure undercuttings, and that certain crispness necessary to the proper effect, particularly of carved work, requires the experienced foundry-man in this class of castings. An architectural and a practical education are both essential to guide and direct a creditable execution. Between the iron fronts of to-day and those erected ten years ago, there is a perceptible improvement. The artistic working up of the material is better understood, and enlarged ideas of proportion and boldness are displayed. In capitals, for example: those first made were strictly in accordance with authorities given in architectural publications. These authorities gave stated heights of columns for their diameters. A 12-in. diameter column should be about ten diameters high (10 ft.). Practically, 12-in. columns for building purposes were required about 15 ft. high. The capitals, however, were made without reference to the stretch in length of the column. By and by it was seen that these capitals were squatty in appearance, like a tall man wearing a low hat. The capitals were then lengthened, and in addition a greater projection given. This treatment was followed on bases, and cornices, &c., until now boldness in every part is carefully sought after.

The price of stone, in consequence of a continuous advance in labour, is doing wonders for iron. In New York there are under contract several entire blocks of dwelling-houses with iron ashlar fronts in place of stone. This iron ashlar is a mere shell in rusticated courses, bolted together and anchored to the brick wall, which latter is of the same thickness as in the case of brick backing to stone. The window openings have sills and lintels of a character similar to stone. This kind of treatment in iron costs less than one-half of the same in stone, and is cheaper than Philadelphia pressed brick, with moulded stone trimmings, for fronts of houses. For this innovation the eight-hour men in part have to answer, but even they cannot stay the progress of iron.

A system of building has been lately brought out which looks to the entire exclusion of brickwork. It consists of a series of hollow cast-iron box columns, placed about 18 ft. apart on a line with the depth of the building. On top of the columns rest wrought-iron cross girders, for sustaining the floor beams. Column over column, with girders, extend to the height of the structure. Between the columns are horizontal and vertical bars, on which are bolted cast-iron plates, of such a character as to receive and retain the plaster, which is spread directly upon them. These iron walls occupy far less space than brick, are economical in construction, incombustible, and able to resist an earthquake shock.

The use of iron in buildings has increased enormously within the past few years, and that it will increase in a greater ratio in the coming years, there can be no doubt. New ideas will push the work on in the march of improvement from its present stand-point. The uses and requirements and values of buildings are changing every day, and iron, in its architectural application, is to fulfil future requirements, such as in the past it has but limitedly supplied.

THE SOCIAL POSITION OF THE ARCHITECT.

EDUCATION.

SIR,—There is much truth in the observations of your correspondent "Experientia" (p. 450, *ante*), but the remedy in a great measure rests with employers, who should satisfy themselves, before they commence a building, that the party whom they propose to employ is not only a well-educated man, but that he has also studied his profession thoroughly as a member of the Royal Institute of British Architects, and previously to commencing practice has passed a creditable examination before some of the members of that society, or others. For this purpose a certain routine, without being too intricate or difficult a course, should be laid down; commencing, perhaps, with a plain course of useful and classical learning, and then proceeding with a thorough course of good reading in the Institute or other professional library, of which there is less lack at the present day than was the case half a century since, when no other book was placed in the student's hands but Sir W. Chambers—and *this* never explained—and *no work* on Gothic architecture for the student.

Some years since, there was a most excellent synopsis published in the *Builder* of that day, pointing out and naming a very valuable course of books to study on every branch relating to the education of the architect. This might be revised, without rendering the course too intricate or laborious to the young student, who becomes shy in placing himself in contact with a professional man for examination. The course of study pursued in France and other countries in the education of youth for a profession is far different, and it is surprising in this country that the hint has not been taken, either by the Royal Academy or even other learned institutions. If a young man is intended to travel, before doing so it becomes essential that he should know how to observe, and avail himself of his travels, having a slight knowledge of French and Italian, combined with Latin. He should also have a thorough knowledge of perspective, sketching, light and shade, with a facility of drawing the figure. It must be borne in mind that we are living in a different era to what we were some fifty years since. We have seen (thanks to the late enlightened Prince) what a boon was gained by the first International Exhibition, and we have since seen the progress and emulation it has excited in this country, in regard to manufactures and science; then why not to architecture? Let us have no bigoted feeling in regard to styles, but let each be well understood and well defined, and let us trust and hope that the day is not far distant that this country may have occasion to be proud of the talent of art, either in architecture, sculpture, or painting, in the form of a building or that of a royal palace. We have youth to encourage this, and a Prince who has travelled, and had every opportunity of witnessing how much better art is studied abroad than in this country. W.

TECHNICAL EDUCATION.

SIR,—At the conference held in the theatre of the School of Mines, in Jermyn-street, on the 24th of June, much regret was felt at the little interest evinced by the employers and artisans of London in the above important movement. Professor Huxley and Dr. Lyon Playfair told the working-men assembled that they must do something themselves if they wanted others to help them; and they further said that if industrial education did not advance, England must, as a necessary consequence, lose her high place among nations, and sink in the scale of civilisation.

Papers were solicited to be read at the conference, but as that course was not followed, the conference was carried out orally, and, as is usual in such cases, much irrelevant matter was introduced. Although general education has made some advance, industrial and scientific education is no higher than it was before the Exhibition in 1851; and it is evident to all but those interested that the working men of this country must have facilities both in and out of the workshop for acquiring a thorough knowledge of the scientific principles whereon their special branches of industry depend. It will not do to lay the blame to workmen alone, as it appears the employers are not yet aware of the fact that in scientific knowledge the masters and men of foreign countries are far in advance of us, and are fully alive to the necessity which exists for the higher development of industrial education. While the Government and great employers of labour in this country have been slumbering, they have been working, and are now reaping their reward by being able to compete successfully in the market of the world with the manufacturers of England. It is to be lamented that employers as a class take but little interest in what is going on around them. The technical conference held at the Society of Arts more than twelve months ago was not attended by a single employer; and up to the present not one employer has, I believe, taken the least notice of the efforts and objects of the technical education committee. The advantages which would result to all parties from establishing libraries of trade literature in connexion with their establishments is unappreciated, and apprentices and young workmen have less advantages now (in so far as learning their trade) than was to be had forty or fifty years ago. They are now left to pick up what they can, without supervision from employer or manager. Schools, lectures, and museums there are none; and the young, after their day's work, think of nothing but the last new star at the local music-hall, or what is out at the gaffs or minor theatre. Since the Great Exhibition of 1851, many warnings have been given to employers in this country, showing that they must be on the alert; and yet not one technical library has been formed, or one school established, and to-day the general body of workmen are not one whit more advanced in systematic and scientific knowledge than they were before foreign competition became so close. What is wanted to remedy the present defective condition of things, and to stimulate the young workmen to higher efforts, is, in my opinion, closer supervision by the heads of establishments, and the formation of a system of rewards for the apprentices who attain the highest proficiency in their respective trades. Some plan ought to be provided whereby every apprentice or articled workman should be informed as to the nature of the obligations he was going to undertake, with the benefits which

will eventually accrue to them, as workmen, from an attentive study of their trade, and in aiming to excel in all they undertake. If that honourable ambition could be formed in early life, it would be the means of preserving them from many snares, and in time would cleanse the workshops from that low moral state into which they have fallen; and, instead of taking a pride in obscene and immoral language, an emulation for the noble would be fostered, and the inertness which now prevails would be eradicated, and all engaged in the good work would reap a rich reward. It is well known that but few English workmen are scientifically taught; and if they have to deviate ever so little from the beaten path they are lost. It is not at all unusual to find men engaged in watchmaking, engine-fitting, and machinery, who never read a work on mechanics and mechanism, and who could not give an explanation of the simple mechanical powers—the lever, crank, and pulley; carpenters who can barely describe a circle, and to whom angles are a mystery entirely beyond their comprehension, and who are entirely lost if any one speak to them of geometry; painters who cannot mix colours; opticians who know nothing of optics; mathematical instrument-makers who never studied mathematics. Illustrations of the above description might be adduced in connexion with every trade, and the evil of it is that they would in no case be exceptional. I have said that employers are apathetic as to what is doing in other countries, and the same may be said of the men. Their leaders are always harping on trade rights and the perfection of trade-unions. Advance of wages is of more interest to them than advance of knowledge, and they seem to suppose that the first can be maintained irrespective of all other considerations. If a look-out be not kept, the industry of the country will fall into the ditch.

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The urgent necessity for the building above named may be easily imagined, when I positively affirm that the materials of the old hall are not worth 10*l*.

We, unfortunately, have those amongst us who are always determined to lead, but never willing to follow.

CLEMENT PRETTY.

*** We have taken some pains to inquire into the position of this question, and are satisfied that it would be greatly for the advantage of Leicester to have at once a fitting and handsome town-hall. Both parties should put their heads together for the common good, call in sound and impartial advice, and make up their minds to follow it. The present structure is quite discreditable, and we believe every one in Leicester who has thought about it feels that it is so. Money wisely used on such improvements increases the value of property in the town where it is spent, and raises the character of its inhabitants.

THEATRICAL.

The Haymarket.—The first part of Mr. Tom Taylor's new drama, "Mary Warner," reminds the playgoer of "Not Guilty," produced at the Queen's Theatre not long ago. This, however, is soon passed, and a fresh combination is made, which gives the principal character, played by Miss Bateman, some excellent situations, of which she makes good use, touching effectively the hearts of the audience. The part of the husband, *George Warner*, an inventive, practical engineer, suits the rough, heavy style of Mr. Howe. Mr. Kendal leaves his gentlemanly ways, and portrays effectively a tipsy, unprincipled vagabond, who is too well treated by the author; and Miss Caroline Hill and a little child give good aid. Without any great endeavours to render the scenery a striking feature, it is sufficiently interesting and realistic to convey fully the time and place. The machines in motion in the engineer's yard on the Lambeth side of the Thames; Plumtree-court, with its gaslights and lamp-lighter; and the interior of George Warner's house, in South Kensington, when he has risen in the world, are well contrived and executed. This piece is increasing in attractiveness, and the house is full every evening. The run, however, can be but short, as Mr. Buckstone's benefit is announced for the 10th, when he will doubtless, as usual, make one of his amusing addresses.

The Charing-cross Theatre.—The house now finished looks pleasant and bright; but parts of the interior must be altered. In the upper boxes, substituted for a gallery, only those sitting in the first and part of the second row can see the stage properly. The seats must be raised. It is a most singular thing that constructors of theatres do not in all cases make themselves certain on points of this sort before the house is opened to the public.

The new Opera-house in Vienna has proved a failure, we are told, in an acoustical point of view, and will require important alterations inside. They should wait a little. Time seems to do something in this respect. We heard an eminent singer state recently that the Royal Italian Opera-house, Covent Garden, has improved so greatly as regards the transmission of sound, that it is now the most delightful place to sing in that an artist could desire.

WASTED ART-TREASURES.

ON Monday last a meeting of the Free Libraries and Museums Committee of the Society of Arts was held at the Society's house in the Adelphi, Mr. H. Cole, C.B., presiding. A number of Members of Parliament were present. The business related exclusively to the subject of the distribution and circulation, to the utmost extent, with reasonable expectation of public advantage, of the works of art, scientific objects, specimens of manufacture, and other objects, matters, and things, fitted to promote technical, scientific, and general culture, that are wasting in oblivion, utterly unproductive and valueless, in the store-cellars and lumber-rooms of some of our great metropolitan collections. There was entire unanimity in the decision arrived at, that strenuous efforts should be made, without delay, to remedy the evil indicated.

The result of the meeting was the adoption of the following resolution:—

"That Mr. Gladstone, the Premier, be requested to receive a deputation from the Free Libraries and Museums Committee of the Society of Arts, appointed to promote the systematic circulation to local museums, libraries, and institutions of the United Kingdom, of the superfluous or unexhibited specimens of works of art, science, and literature in the national museums and galleries in the metropolis."

In this important matter there can happily be no party feeling, and it may be expected that a very powerful deputation will wait upon Mr. Gladstone, and press upon him the reasonable object they are organised to promote.

ARCHITECTS AND QUANTITIES.

SIR,—Knowing your strict impartiality, I am sure you will not deny me space for the few remarks I have to make on this subject. A contract being advertised, being a builder, I instinctively at this dull time made my way to the architect's office, whose name is attached to the advertisement, and obtained the bill of quantities for the work, and sat down for the purpose of pricing out and making up my offer for the work contained therein. Instead of that I address myself to you, Mr. Editor, being annoyed at the very outset by the three paragraphs that precede each section of the work; and as the same obnoxious lines often appear whenever an architect takes out the quantities for work he has in hand, I feel determined to commit this common cause of complaint to your judgment. The first paragraph on the bill is—

1st. The contractor whose tender is accepted will be at liberty to compare the following bill of quantities with the drawings and specifications before he signs the contract, and any errors then pointed out will be corrected.

2nd. After accepting the bill of quantities as correct, no notice can be taken of any errors that may subsequently be discovered.

3rd. The contractor is to pay the architect 2½ per cent. on the amount of complete tender for the bill of quantities, &c.

Now, Mr. Editor, I do not complain of the first and second paragraphs, if the third is left out; and I have not much to say about the third if the first and second are left out, but as a whole they are most unjust to contractors. Sir, I think you will easily see how these conditions work against the contractor.

"The contractor is to pay the architect 2½ per cent. on the amount of complete tender for the bill of quantities, but he has to compare the bill with the drawings and specifications to ascertain if they are correct," thus re-doing the work for which the architect receives 2½ per cent. commission, and the contractor (for the same work) not a penny.

Now, Mr. Editor, I would ask those architects that adopt this system, why the contractor has to be at the expense of checking their quantities when they are *well paid* for ascertaining the *correct amount* of work to be done; and further, when any deficiency appears after signing the contract, the contractor has to forego all claim to such deficiency, simply because he has not found it sooner? In conclusion, I ask, are contractors fairly dealt with? Do they get justice and equity from the architects? I say, no. I think it only fair that a competent surveyor should be employed who *guarantees* the bill to be correct, as the person who takes out the quantities ought to be the only person responsible for any mistake arising therefrom. Or, if the contractor is to have any responsibility in the matter, the architect should divide with him the commission, as the contractor has as much labour to perform in checking the bill as the architect originally has in making it out.

A CONTRACTOR.

SIR,—It appears that the quantities of Wolverhampton new townhall were supplied by the architect, for which he will probably pocket a few hundreds for a few weeks' calculations; but to render the task safe, as well as profitable, he refuses to guarantee their correctness.

The builder already claims 500*l*. for works required by the plans and specification, but not in the quantities.

The question I wish to ask is, what guarantee have the committee or the ratepayers that those quantities do not contain more work or more materials than what the builder, by the plan and specification, undertakes to perform; of this, should it be the case, we could not expect the builder to complain; and as the architect appears to have doubt about his accuracy in the matter, we ought to have none, but at once have them checked by a townsman.

A RATEPAYER.

rays. Painting, too, reveals the unevenness and imperfections of the casting in a magnified degree, particularly when the sun's rays strike it at certain angles. On stone surfaces, after being made level and true with the chisel, there is still a grain and a slight but regular roughness of surface which prevents a glaring reflection. By a simple but very effectual process—that of casting the plain surfaces of iron with a fine cord running vertically—the shafts of columns, and ashlars, and lintels, &c., are given that charm of chiaroscuro which, by its delicate play of light and shadows, makes it soft and pleasant to the eye. This fine crimping destroys the effect of the usual and ordinarily unavoidable unevenness in the surface of castings, and in effect makes iron altogether more nearly to resemble stone.

When iron fronts were first introduced it was strenuously asserted by some, that expansion and contraction would dislocate the joints, and render a building unsafe. An examination of any of the numerous cast-iron structures, which, for a number of years, have been exposed to every change of atmospheric temperature without, and to the heat of steam-boilers, &c., within, will show everything unchanged. This proves that the temperature of our climate, throughout its utmost range, from the greatest cold to the greatest heat, exerts upon it no appreciable effect. Events have also proved, in the cases of the burning of store-houses, filled with combustible goods, that cast-iron fronts are absolutely fireproof, and will neither warp, nor crack, nor fall down. Only let it be remembered that, in addition to a high and intense heat, the use of a blast is required to reduce iron to a molten state, and the ability of iron fronts to withstand fire will be readily understood. They are also perfectly safe during thunder-storms. The metal, presenting so great a mass to the over-charged clouds, becomes a huge conductor in itself, and silently conveys all the electricity to the earth. In them, the intensity current is instantly diffused throughout the entire mass, and changed into a current of quantity, thus obviating all danger from disruptive discharges.

A front of iron can be previously prepared and fitted in the manufactory, and thence safely transported to the place of erection and put together with wonderful rapidity, and at all seasons of the year. It takes up less space than a stone front with brick backing, and so enlarges the interior of a building. When it becomes desirable to tear down the building itself, to make way for other improvements, the iron front may be taken to pieces, without injury to any of its parts, and be re-erected elsewhere, with the same perfection as at first. Instead of destruction, there would be removal only. In iron, as in other materials, must ever be observed those undeviating laws of proportion, and rules deduced from a refined analysis of what is suitable in the highest degree to the end proposed. There is not a structure erected anywhere, but adds its quantum to the good or bad impressions to be directly stamped upon the public mind. Thus every one who builds is unwittingly enhancing, or deteriorating, the taste of the masses; and the aggregate result of this is a thing not to be over-estimated. It behoves the general use and careful treatment of a material which allows greater architectural effect, in proportion to the outlay of money, than any other. In our new and growing country, the dollars saved on one building are required for the erection of another, or for use in railroad, or mining, or manufacturing enterprises. It is primarily a duty for every builder to do the most with his money and the most for art.

On the manufacturer depends the artistic appearance of an iron building as well as its durability. The material is capable of receiving the sharpest kind of lines. But to secure undercuttings, and that certain crispness necessary to the proper effect, particularly of carved work, requires the experienced foundry-man in this class of castings. An architectural and a practical education are both essential to guide and direct a creditable execution. Between the iron fronts of to-day and those erected ten years ago, there is a perceptible improvement. The artistic working up of the material is better understood, and enlarged ideas of proportion and boldness are displayed. In capitals, for example: those first made were strictly in accordance with authorities given in architectural publications. These authorities gave stated heights of columns for their diameters. A 12-in. diameter column should be about ten diameters high (10 ft.). Practically, 12-in. columns for building purposes were required about 15 ft. high. The capitals, however, were made without reference to the stretch in length of the column. By and by it was seen that these capitals were squatty in appearance, like a tall man wearing a low hat. The capitals were then lengthened, and in addition a greater projection given. This treatment was followed on bases, and cornices, &c., until now boldness in every part is carefully sought after.

The price of stone, in consequence of a continuous advance in labour, is doing wonders for iron. In New York there are under contract several entire blocks of dwelling-houses with iron ashlar fronts in place of stone. This iron ashlar is a mere shell in rusticated courses, bolted together and anchored to the brick wall, which latter is of the same thickness as in the case of brick backing to stone. The window openings have sills and lintels of a character similar to stone. This kind of treatment in iron costs less than one-half of the same in stone, and is cheaper than Philadelphia pressed brick, with moulded stone trimmings, for fronts of houses. For this innovation the eight-hour men in part have to answer, but even they cannot stay the progress of iron.

A system of building has been lately brought out which looks to the entire exclusion of brick-work. It consists of a series of hollow cast-iron box columns, placed about 18 ft. apart on a line with the depth of the building. On top of the columns rest wrought-iron cross girders, for sustaining the floor beams. Column over column, with girders, extend to the height of the structure. Between the columns are horizontal and vertical bars, on which are bolted cast-iron plates, of such a character as to receive and retain the plaster, which is spread directly upon them. These iron walls occupy far less space than brick, are economical in construction, incombustible, and able to resist an earthquake shock.

The use of iron in buildings has increased enormously within the past few years, and that it will increase in a greater ratio in the coming years, there can be no doubt. New ideas will push the work on in the march of improvement from its present stand-point. The uses and requirements and values of buildings are changing every day, and iron, in its architectural application, is to fulfil future requirements, such as in the past it has but limitedly supplied.

THE SOCIAL POSITION OF THE ARCHITECT.

EDUCATION.

SIR,—There is much truth in the observations of your correspondent "Experientia" (p. 450, *ante*), but the remedy in a great measure rests with employers, who should satisfy themselves, before they commence a building, that the party whom they propose to employ is not only a well-educated man, but that he has also studied his profession thoroughly as a member of the Royal Institute of British Architects, and previously to commencing practice has passed a creditable examination before some of the members of that society, or others. For this purpose a certain routine, without being too intricate or difficult a course, should be laid down; commencing, perhaps, with a plain course of useful and classical learning, and then proceeding with a thorough course of good reading in the Institute or other professional library, of which there is less lack at the present day than was the case half a century since, when no other book was placed in the student's hands but Sir W. Chambers—and *this* never explained—and *no work* on Gothic architecture for the student.

Some years since, there was a most excellent synopsis published in the *Builder* of that day, pointing out and naming a very valuable course of books to study on every branch relating to the education of the architect. This might be revised, without rendering the course too intricate or laborious to the young student, who becomes shy in placing himself in contact with a professional man for examination. The course of study pursued in France and other countries in the education of youth for a profession is far different, and it is surprising in this country that the hint has not been taken, either by the Royal Academy or even other learned institutions. If a young man is intended to travel, before doing so it becomes essential that he should know how to observe, and avail himself of his travels, having a slight knowledge of French and Italian, combined with Latin. He should also have a thorough knowledge of perspective, sketching, light and shade, with a facility of drawing the figure. It must be borne in mind that we are living in a different era to what we were some fifty years since. We have seen (thanks to the late enlightened Prince) what a boon was gained by the first International Exhibition, and we have since seen the progress and emulation it has excited in this country, in regard to manufactures and science; then why not to architecture? Let us have no bigoted feeling in regard to styles, but let each be well understood and well defined, and let us trust and hope that the day is not far distant that this country may have occasion to be proud of the talent of art, either in architecture, sculpture, or painting, in the form of a building or that of a royal palace. We have youth to encourage this, and a Prince who has travelled, and had every opportunity of witnessing how much better art is studied abroad than in this country. W.

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We, unfortunately, have those amongst us who are always determined to lead, but never willing to follow.

CLEMENT PRETTY.

*** We have taken some pains to inquire into the position of this question, and are satisfied that it would be greatly for the advantage of Leicester to have at once a fitting and handsome town-hall. Both parties should put their heads together for the common good, call in sound and impartial advice, and make up their minds to follow it. The present structure is quite discreditable, and we believe every one in Leicester who has thought about it feels that it is so. Money wisely used on such improvements increases the value of property in the town where it is spent, and raises the character of its inhabitants.

THEATRICAL.

The Haymarket.—The first part of Mr. Tom Taylor's new drama, "Mary Warner," reminds the playgoer of "Not Guilty," produced at the Queen's Theatre not long ago. This, however, is soon passed, and a fresh combination is made, which gives the principal character, played by Miss Bateman, some excellent situations, of which she makes good use, touching effectively the hearts of the audience. The part of the husband, *George Warner*, an inventive, practical engineer, suits the rough, heavy style of Mr. Howe. Mr. Kendal leaves his gentlemanly ways, and portrays effectively a tipsy, unprincipled vagabond, who is too well treated by the author; and Miss Caroline Hill and a little child give good aid. Without any great endeavours to render the scenery a striking feature, it is sufficiently interesting and realistic to convey fully the time and place. The machines in motion in the engineer's yard on the Lambeth side of the Thames; Plumtree-court, with its gaslights and lamp-lighter; and the interior of George Warner's house, in South Kensington, when he has risen in the world, are well contrived and executed. This piece is increasing in attractiveness, and the house is full every evening. The run, however, can be but short, as Mr. Buckstone's benefit is announced for the 10th, when he will doubtless, as usual, make one of his amusing addresses.

The Charing-cross Theatre.—The house now finished looks pleasant and bright; but parts of the interior must be altered. In the upper boxes, substituted for a gallery, only those sitting in the first and part of the second row can see the stage properly. The seats must be raised. It is a most singular thing that constructors of theatres do not in all cases make themselves certain on points of this sort before the house is opened to the public.

The new Opera-house in Vienna has proved a failure, we are told, in an acoustical point of view, and will require important alterations inside. They should wait a little. Time seems to do something in this respect. We heard an eminent singer state recently that the Royal Italian Opera-house, Covent Garden, has improved so greatly as regards the transmission of sound, that it is now the most delightful place to sing in that an artist could desire.

WASTED ART-TREASURES.

ON Monday last a meeting of the Free Libraries and Museums Committee of the Society of Arts was held at the Society's house in the Adelphi, Mr. H. Cole, C.B., presiding. A number of Members of Parliament were present. The business related exclusively to the subject of the distribution and circulation, to the utmost extent, with reasonable expectation of public advantage, of the works of art, scientific objects, specimens of manufacture, and other objects, matters, and things, fitted to promote technical, scientific, and general culture, that are wasting in oblivion, utterly unproductive and valueless, in the store-cellars and lumber-rooms of some of our great metropolitan collections. There was entire unanimity in the decision arrived at, that strenuous efforts should be made, without delay, to remedy the evil indicated.

The result of the meeting was the adoption of the following resolution:—

"That Mr. Gladstone, the Premier, be requested to receive a deputation from the Free Libraries and Museums Committee of the Society of Arts, appointed to promote the systematic circulation to local museums, libraries, and institutions of the United Kingdom, of the superfluous or unexhibited specimens of works of art, science, and literature in the national museums and galleries in the metropolis."

In this important matter there can happily be no party feeling, and it may be expected that a very powerful deputation will wait upon Mr. Gladstone, and press upon him the reasonable object they are organised to promote.

ARCHITECTS AND QUANTITIES.

SIR,—Knowing your strict impartiality, I am sure you will not deny me space for the few remarks I have to make on this subject. A contract being advertised, being a builder, I instinctively at this dull time made my way to the architect's office, whose name is attached to the advertisement, and obtained the bill of quantities for the work, and sat down for the purpose of pricing out and making up my offer for the work contained therein. Instead of that I address myself to you, Mr. Editor, being annoyed at the very outset by the three paragraphs that precede each section of the work; and as the same obnoxious lines often appear whenever an architect takes out the quantities for work he has in hand, I feel determined to commit this common cause of complaint to your judgment. The first paragraph on the bill is—

1st. The contractor whose tender is accepted will be at liberty to compare the following bill of quantities with the drawings and specifications before he signs the contract, and any errors then pointed out will be corrected.

2nd. After accepting the bill of quantities as correct, no notice can be taken of any errors that may subsequently be discovered.

3rd. The contractor is to pay the architect 2½ per cent. on the amount of complete tender for the bill of quantities, &c.

Now, Mr. Editor, I do not complain of the first and second paragraphs, if the third is left out; and I have not much to say about the third if the first and second are left out, but as a whole they are most unjust to contractors. Sir, I think you will easily see how these conditions work against the contractor.

"The contractor is to pay the architect 2½ per cent. on the amount of complete tender for the bill of quantities, but he has to compare the bill with the drawings and specifications to ascertain if they are correct," thus re-doing the work for which the architect receives 2½ per cent. commission, and the contractor (for the same work) not a penny.

Now, Mr. Editor, I would ask those architects that adopt this system, why the contractor has to be at the expense of checking their quantities when they are *well paid* for ascertaining the *correct amount* of work to be done; and further, when any deficiency appears after signing the contract, the contractor has to forego all claim to such deficiency, simply because he has not found it sooner? In conclusion, I ask, are contractors fairly dealt with? Do they get justice and equity from the architects? I say, no. I think it only fair that a competent surveyor should be employed who *guarantees* the bill to be correct, as the person who takes out the quantities ought to be the only person responsible for any mistake arising therefrom. Or, if the contractor is to have any responsibility in the matter, the architect should divide with him the commission, as the contractor has as much labour to perform in checking the bill as the architect originally has in making it out.

A CONTRACTOR.

SIR,—It appears that the quantities of Wolverhampton new townhall were supplied by the architect, for which he will probably pocket a few hundreds for a few weeks' calculations; but to render the task safe, as well as profitable, he refuses to guarantee their correctness.

The builder already claims 500*l*. for works required by the plans and specification, but not in the quantities.

The question I wish to ask is, what guarantee have the committee or the ratepayers that those quantities do not contain more work or more materials than what the builder, by the plan and specification, undertakes to perform; of this, should it be the case, we could not expect the builder to complain; and as the architect appears to have doubt about his accuracy in the matter, we ought to have none, but at once have them checked by a townsman.

A RATEPAYER.

CASES UNDER THE METROPOLITAN BUILDING ACT.

ALTERATION OF WOODEN BUILDINGS.

MR. R. SMITH, of Newington-butts, corner of Francis-street, appeared before Mr. Woolrych, Lambeth, to a summons which had been adjourned from Friday, the 18th June, in which it was complained by Mr. Long, the district surveyor, that he had erected or so altered a wooden shed in the rear of his premises as to be in contravention of the Building Act, by not having it constructed of incombustible materials.

Mr. Arnold, from the firm of Messrs. H. & F. Chesters, solicitors, of Newington, appeared for the defendant, and contended that the building existed long before the Building Act, having been erected upwards of thirty years; and also that, according to the 150th section, proceedings should have been taken within a month of the discovery of the alteration.

Mr. J. Carpenter and Mr. Z. Cohen, who had lived in and known the premises for upwards of thirty-five years, deposed that the shed had all the time remained in the same condition with the exception of a few necessary repairs.

It was, however, contended that a greater part of the shed as it at present stood was new, and evidence was called to prove that the timber used in the alterations was enough to make more than one-half of the building "new."

An adjournment was agreed to for the purpose of enabling Mr. Woolrych to view the premises, which having been done, he said that certainly one-half was new, and that brought the case within the Act. He therefore decided that the alterations must be so made as to comply with the Building Act.

ALBERT INSTITUTE, WINDSOR.

SIR,—If any of your readers take sufficient interest in this matter, to turn to our letter in your impression of the 5th ult., they will see that Mr. Sim's letter in your last number confirms the justice of our complaint.

To his counter-charge that we suppressed the fact of a meeting having been called to consider the position of the scheme, and that certain subscribers had "talked of writing" to have their subscriptions cancelled, as there was so little promise of the work going on, we reply that the alleged facts had not come to our knowledge; and that if they had, they are entirely beside the question. We can, therefore, lay no claim to the "ingenuity" with which he credits us.

What he means by advising us to let the fact of our success in this competition "rest in peace," we do not know; nothing is, however, further from our intention.

Mr. Sim's statement that the meeting he adverts to stands adjourned till next month, certainly does not improve his case; for it was scarcely decent that he should *in the interim* come forward with his plan for taking the commission out of our hands.

We should not have trespassed on your kindness in this matter, but that at the present moment much consideration is being given to measures for raising the status, and securing the dignity, of the profession; and it is, at least, desirable that those who have in hand the cure of a disease should be made acquainted with its various manifestations.

BACON & BELL.

METROPOLITAN BOARD OF WORKS.

AT the last weekly meeting of this Board, the first subject considered was a claim of 14,500*l.* against the Board.

The Works and General Purposes Committee brought up a report which recommended that the claim of Mr. Crook (14,500*l.*), in respect of loss which he alleges he has sustained under his contract for the engines at the Abbey Mills Pumping Station, by reason of the delay in starting them, be settled at the sum of 3,050*l.* Eventually the subject was agreed to be referred back to the committee for further investigation.

Southwark Park.—The thanks of the Board were given to the vestries who had provided the entertainment on the occasion of opening the Southwark Park, and a memorial from the inhabitants praying the Board not to let any part of the park for building purposes was referred to the Works and Improvements Committee.

Finsbury Park.—It was announced that Finsbury Park would be opened to the public early in the month of August.

SANITARY PROGRESS IN KIDDERMINSTER.

AT a meeting of the town council to consider communications recently received from the Home Secretary with regard to a memorial of the guardians; to consider a resolution as to opening up, widening, and properly paving the streets of the town; and the appointment of a surveyor under the Local Government Act; the council resolved, on the first subject, by 11 votes to 2;—

"That, as the town has only just adopted the Local Government Act, and has not yet had a fair opportunity of properly carrying out and working the same, no steps be taken until sufficient time has elapsed to test whether or not such Local Government Act will provide all necessary requirements."

It was also resolved:—

"That the Council use the powers given to them as a Local Board to widen, improve, and open up streets where they found this necessary."

Mr. Corbet, in supporting this resolution, said, as an illustration of his argument, that there were many who, when a new market, at an expense of 2,000*l.*, was projected, said it would be a ruinous loss, whereas, they had now a handsome, well-arranged market, a credit to the town; and what had just happened? They had let it for 455*l.*, or 220*l.* more than the old one fetched, and were thus getting 10*l.* per cent. for their outlay. He referred to other towns where similar improvements had been effected, and concluded by saying the times required spirited although judicious legislation. The mayor then said, in reference to the appointment of a surveyor, that it was considered that the municipal offices—as the nuisance inspector, collector of rates, superintendent of the street repairs, and other offices—might be united in one person, to whom they could thus afford to give a salary of about 180*l.*; but it was urged that he should give his whole time to the duties of his office; and at length the council resolved to advertise for a suitable person in the four papers having the greatest circulation in the district; viz., the *Daily Gazette, Daily Post, Brierley Hill Advertiser*, and *Kidderminster Times*; and also in the *Builder*.

ARRANGEMENTS FOR STREET TRAFFIC.

SIR,—Seeing a notice in your paper as to bridges across the streets for foot passengers has determined me to ask your permission to propose a scheme which seems to me worthy of consideration. It is simply this,—In very crowded thoroughfares to construct a footway over the present path, at the height of the first-floor, the sides of the streets being connected by bridges. A large part of the present path could thus be thrown into the roadway, giving more room for vehicles, while foot-passengers would be completely removed from all danger. The inconvenience caused by the alteration to the householders would be compensated for by the additional value given to the house, since the first floor would be converted into a ground floor, and the second floor into a first floor, while the present ground floor would be valuable for warehouses. Not being an engineer, I do not enter into the question of how it is to be done; but if it were necessary to carry iron girders across the streets to support the paths, it might in time lead to the formation of an intermediate roadway, which, being used only for light traffic, would leave the lower one (then, as it were, subterranean) for the heavy wagons, which now render locomotion so difficult.

S. ARTHUR SEWELL.

THE VELOCIPEDE.

SIR,—In a recent number of the *Builder* you quote paragraphs showing that years ago you suggested the use of self-propelling carriages to convey persons to their business, &c. May I now ask, through your paper, what we are to do with them when we get there? Everybody asks me this. Can we not have velocipede *stables*, where they could be kept during the day at a *moderate charge*? They do not occupy much room.

AN ARCHITECT'S CLERK AND VELOCIPEDIAN.

*** Not occupying much room, they might often be permitted to be taken into offices or other business premises; or into the back courts, &c., of coffee-houses, and other places, where dinner or tea is had. But, no doubt, special places will be opened, as in carriage depôts, stables, &c., at 1d. each, or so.

UNDERGROUND TEMPERATURE.

THE temperature inside the earth has often been a matter of speculation. Mr. G. J. Symons, the well-known authority on rain and rainfall, has been investigating the subject. He has carried on his experiments at Hampstead. A well was sunk there many years ago into the chalk to the depth of between 500 ft. and 600 ft. for the water supply, and the demand exceeding the supply, an Artesian bore was made through the centre of the well to the depth of a quarter of a mile, in expectation of finding water in abundance in the lower greensand. The Waterworks Company, 1853, reached the depth of 1,302 ft., sunk nearly 8,000*l.* in two years, found no lower greensand, unfortunately, no water, and became ruined. The property passed eventually into the hands of the new River Company, who accorded to Mr. Symons the permission he sought to conduct a series of thermometric experiments on the abandoned site. Mr. Symons erected a hut over the well, and fitted up a little observing-house. At the British Association meeting at Dundee a committee was appointed to investigate the temperature of the earth at great depths. Mr. Symons is a member of that committee, also Sir W. Thomson, who moved for its appointment. Upon the solution hang certain matters of contention between Sir William and Professor Huxley as to how far underground temperature may be made to test the age of the world. Mr. Symons's experiments are not yet concluded. The results so far he regards as decisive. He has made gradual observations down to a depth of 1,100 ft., and has ascertained that the temperature there is 20 degrees higher than above ground; that is to say, the thermometer showed 70 degrees, whereas the mean temperature of London is 50 degrees. If this rate of increase continues, as there seems no reason to doubt would be the case, boiling point (212 degrees) would be reached about a mile and a half down. At present, however, Mr. Symons is at a standstill; he has literally stuck in the mud. About 200 ft. of blue-black deposit has accumulated at the bottom of the tube, and into this the thermometers cannot penetrate. Of course the learned society under whose auspices the work is being prosecuted will forbid such an ignominious termination of a valuable investigation, the like of which has never before been attempted.

INTERNAL DECORATION.

YOUR recent article on the "Use of Plaster in Decoration," is well worthy the study of every lover of art, as applied to the internal decoration of houses. It shows in a concise form the utter inutility of the material as regards its durability, and as a means of support, and also as to its "tenacity" for adhering to all the dust which may arise to its surface. The question now presents itself, what is the legitimate material to use in the external decoration of a building? I have briefly explained in former letters that glazed surfaces of clay are the most durable and legitimate for the external decoration of a building. Now, if this system can be adopted where it is exposed to all kinds of weather, and to every variation of atmosphere (especially damp), to which the climate of Great Britain is subject, why, I would ask, could it not be employed internally? As regards the bracketing and supporting of angles, instead of having a "*sham*," which is *supposed* to support the corner of a room, you have a material which will have the strength of wood or stone, and which is more durable than either. If earthenware and china can be manufactured, and sold at such a cheap rate (and a manufacturer can afford to sell a white and gold china tea-service of twenty-eight pieces, for 8*s.* 6*d.* to a wholesale dealer), why could not a cornice, a bracket, or a centre flower be made and sold at an equally moderate price? You cannot purchase an ornamented centre flower in plaster under 7*s.* 6*d.* or 10*s.*, and I am quite sure if twenty-eight pieces of china can be sold glazed and gilt, for 8*s.* 6*d.*, a centre flower of the same material could be produced for the same sum, with a good profit to the producer. I venture to assert that internal decorations could be sold at a considerably less sum than what I have quoted, as they could be made of a terra-cotta body, and washed over with a white glazed surface, which would be much cheaper than making the whole body of china or earthenware. This system would undoubtedly be a great advance on the present mode of internal decoration, and could be adopted by the "enrichment" decorators in plaster themselves, so that they could not complain of having their "trade" taken out of their hands, as they would be merely substituting another more durable and legitimate material for the one they are now using.

ALPHA.

WHAT ABOUT THE OLD PAVING STONES?

SIR,—What becomes of the granite paving-blocks continually removed from our roadways by the contractors for the re-paving of them? Are they allowed for in the fresh contract?

I ask these questions, because, after watching the operation on many occasions, it has struck me, that by relaying the blocks bottom upwards, the same purpose would be answered, without the expense of new granite, as the wear and tear cannot have taken off above ¼ in. of stone, and for such a trifle it seems gross extravagance to purchase new blocks.

The old blocks, by a little labour bestowed upon them, must yield the contractors a very handsome return when chipped and relaid in other thoroughfares, under other contracts. Perhaps I may be mistaken, and these blocks may be broken into small pieces for macadamizing purposes. At all events, as an over-burthened rate-payer, I should like to get some reliable information on the subject.

EAGLE EYE.

NUMBER OF BELLS IN OLD TIMES.

SIR,—I think I can answer Mr. Parry's question, in your issue of the 15th of May ult., about the number of bells before the Reformation.

In small parishes, *three* was the usual number; each service of the day was to be marked by the tone of a different bell: so three bells would suit,—*Mane, Meridie, Vespere.* For the first Vespers, the Ave Maria bell was rung, the angelical salutation being then said. (See Rapin, Hist., vol. v., p. 403.)

At Osney Abbey they had six bells (afterwards transferred to Christ Church, Oxon), called *Douce, Clement, Austin, Hautecter, Gabriel*, and *John*. In an old MS. relating to the religious offices performed in that abbey, it is said, "*Finito Agnus Dei, enollentur Douce, Clement, et Austin; et post missam, per non magnum spatium, pulsentur. Et notandum, quod semper*

post magnam missam, pulsetur Hautecter; ad completorium Gabriel vel John." (See "Hearne's Curious Discoveries," p. 305.)

On festival days, according to the ancient rituals, all the bells were to be rung, "et hanc pulsationem *classicum* vocant." (See "Bona, de Rebus Liturgicis," p. 178.)

"*Enollor*" means "to *toll*," unde "*knell*;" and when more than one bell is so sounded, they make a *chime*. "*Pulso*" means "to *ring*."

H. T. ELLACOMBE, M.A.

CHURCH-BUILDING NEWS.

Holloway.—The foundation-stone of a new church, dedicated to St. Peter, has been laid in Kingsdown-road. The site was purchased out of the Bishop of London's Fund, which contributed 6,000*l*. The total amount besides, received before the laying of the stone, was 2,500*l*. Three sides of the edifice will face the Kingsdown, Shadwell, and Montpelier Roads respectively, and the principal entrance will be from the last of these roads. The structure will be in the Gothic style, and of simple character. The walls will be of brick, faced with yellow stocks, with Bath stone dressings. The nave, at the east end of which there will be a three-sided apse, will be 100 ft. long, 24 ft. wide, and 55 ft. high from the floor to the boarding of the roof. On either side will be aisles, each 80 ft. long, 13 ft. wide, and 20 ft. high. These will be separated from the nave by five pointed arches, supported on coupled columns of polished red granite. The church will be lighted by fifteen two-light clearstory windows, extending round the north, east, and south sides of the building, while at the west end there will be a large rose window over five lancets. In addition to those of the clearstory there will be ten windows in the aisles, placed at such an elevation that the galleries which it is ultimately proposed to erect will not intercept the light from them. The number of sittings provided on the ground floor will be nearly 700. The galleries, which will not be erected at present, are designed to hold about 300 persons, so that the church will contain 1,000 sittings when completed. The contract for the erection of the edifice has been taken by Mr. Thompson, of Camberwell-green, for 4,880*l*. Messrs. Henry Jarvis & Son, of Southwark, are the architects.

Bury (*Lancashire*).—The Bury new cemetery has been formally opened. The site is a little over a mile from the centre of the town, and a little off the main road to Manchester. The grounds contain 33a. 1r. 27p. statute measure: 20 acres of which are intended to be devoted to the burial of the dead, and will contain 22,054 graves. The remaining 13a. 1r. 27p. are set aside for walks for the use of the inhabitants of the town. The drains are from 10 ft. to 14 ft. deep, and are constructed of dry rubble. They vary from 2 ft. 6 in. to 1 ft. 6 in. diameter; the total length of the main drains being 2,221 lineal yards. The whole site of the cemetery and walks is surrounded by a boundary-wall of par-points backed with rubble, having an average height of 4 ft. 6 in. This includes a stone and weathered coping 1 ft. 3 in., with 4-ft. piers at intervals. Between these piers and extending all round the grounds, is an ornamental railing of wrought-iron vertical bars, fitted in with cast-iron tracery from a special design. There are three entrances, viz.—one at the north-east corner, one at the south-east, and the principal at the south side. The carriage or main gateway is 12 ft., with piers at either side 4 ft. 9 in. square at the base, and 19 ft. 6 in. high, with buttresses and crocketed canopies. The Established Church is cruciform on plan, with an octagonal apse. Its extreme length is 52 ft., and the width across the transepts 34 ft. 6 in. There is a south porch facing the tower entrance, and between these is a vestibule screened off from the main body of the chapel with a glazed screen. The roof is open-timbered. The interior is fitted up with open seats having ornamental iron bench-ends. The floors are laid with ornamental tiles of a geometrical pattern. The tower and spire are 76 ft. high. The roof is covered with blue and green slates in patterns. The style is Decorated. The plan of the Dissenters' Chapel consists of a porch, vestibule, small tower, nave, and vestry—the vestry occupying the place of the chancel. The vestry and vestibule are screened off from the nave, and glazed as in the former structure. The fittings are of red deal, with moulded caps to bench-ends, stop-chamfered. The south-west angle-tower and spire are 54 ft. high, and in many points look bolder than in the case of the church building. The tower, besides being a ventilating tower, adds to the general character of the structure. The roof is open-timbered, of steep pitch, stained and varnished. It is covered with purple and blue slates, with ornamental ridging. The plan of the Roman Catholic Chapel forms a nave, chancel, porch, and vestry. The roof is open-timbered. The chancel-arch is partly supported by carved caps and columns. The fittings are of red deal, stained and varnished. The floor is to be laid with ornamental tiles. The west end (exterior) is crowned by a bell-gable with canopy, underneath which is a colossal figure of a bishop, 6 ft. 6 in., supported on a carved cap, column, and pendant. The gable is pierced with two two-light traceried windows. The extreme length of the chapel is 44 ft., the width of the nave 17 ft. 9 in., and the width of the chancel 12 ft. The roof is covered with blue and green slates, arranged in alternate bands, and cut to pattern. The ridge is blue Staffordshire tile-cresting. The registrar's house is situated to the right of the main entrance. The gardener's lodge is one story high. At the back and near to this is a propagating house, 60 ft. by 15 ft., for the use of the grounds. The grounds and walks have been artistically arranged. The total length of roads and walks is 4,745 yards, or nearly three miles. The total number of trees and shrubs planted in the grounds is 41,662. The designs were by Mr. James Farrar, borough surveyor for Bury, and by Mr. Henry Styan, architect, Manchester. Mr. Thomas Vicar acted as clerk of the works. The carving was by Mr. Joseph Bonehill, Manchester, while the greatest portion of the stone-work was executed by the *employés* of the Burial Board. The joiner-work was by Mr. F. Dawson, contractor, Elton; the ironwork by Mr. Joseph Downham; the plumbers' work by Mr. T. Cornall; the painting and plastering by Messrs. Jacob Lomax & Sons, all of Bury; the slating by Mr. Kirkley, of Manchester; the tiles being supplied by Messrs. Minton, of Stoke.

PROVINCIAL NEWS.

Great Wollaston.—The foundation stone of a new vicarage has been laid here. The ground for site, garden, and paddock is the gift of Mr. R. Gardner, of Sansaw; the estimated cost of land and building, 1,150*l*. A new church is to be built in a central part of the parish, money for the site and burying-ground having been left by a former incumbent. Messrs. Bowdler & Darlington, of Shrewsbury, are the contractors for the vicarage.

Otley.—The memorial stone of a new mechanics' hall has been laid here. The new building will be in the modern Italian style, and will include on the ground-floor a small lecture-room, which may be divided into two class-rooms, retiring or cloak rooms, reading-room, library, two class-rooms, lavatory, &c. On the basement will be a kitchen, scullery, chemical class-room, heating apparatus, coal and lumber closets, &c. The first-floor will comprise a large concert-room, with gallery, platform, orchestra, and organ. Over the class-rooms and under the orchestra will be a general and ladies' retiring-rooms, and a librarian's residence will be attached to the institution. The concert-room will accommodate about 900 persons, allowing to each a space of 2 ft. 6 in. by 1 ft. 6 in. The orchestra will contain sittings for about 120 singers, exclusive of platform room, and ample entrance and exit accommodation will be provided.

Burslem.—Mr. Edward Challinor, of Tunstall, has decided upon the erection of a new manufactory on the site of the old Oven House Works at Burslem, which are being pulled down. The new works will be of the most modern construction, and will include a mill for the grinding of materials and colour. The contract for the building has been undertaken by Mr. John Stringer, of Sandbach, and that for the engineer's work by Mr. William Boulton, of Burslem. The whole has been designed by Mr. George B. Ford, of Burslem, architect, and will be carried out under his superintendence.

Templesowerby (*Carlisle*).—The foundation stone of Oustenstands bridge has been laid. Oustenstands is a point on the River Eden, about a mile and a half south of the village of Templesowerby, and about a mile from that station on the Eden Valley Railway. The works have already made considerable progress. The plan of Mr. Bintley, of Kendal, was accepted; and the contract for the work was let to Mr. Hepworth, of Kendal. The width of the river where the bridge will cross is about 150 ft. The bridge will be built of stone, and will consist of four arches; three of these will be 30 ft. span, and the fourth, a dry arch, will span 54 ft. The bridge is vested in trustees.

Blackburn.—New parsonage-houses are being erected as residences for the vicar of the parish of St. John, Blackburn, and also for the vicar of St. Mark's, at Witton. The former is to cost about 1,800*l*., and the latter about 1,100*l*., exclusive of laying out and ornamenting grounds, &c. The land in both cases has been a gift from Mr. Joseph Fielden, of Witton Park. Mr. Joseph Brierley, of Blackburn, is the architect.

STAINED GLASS.

Hanley Castle.—At a parish meeting held at Easter last, the following resolution was unanimously adopted:—"That some substantial memorial be erected by the parishioners of Hanley Castle, to the memory of the late Mrs. Lechmere, and for this purpose a subscription be entered into, and a committee appointed to carry out this object." In accordance with this resolution, the committee appointed at the meeting have decided upon filling the west window in Hanley Castle, with stained glass of the richest and best quality, the subject of the design to be "The Ascension," the cost to be defrayed by subscriptions raised in the parish. The amount required, about 190*l*., was collected in a few days: the sum was limited to that amount, and the subscription to the parish.

Trinity Church, Tewkesbury.—Mrs. Laing, of the Mythe, Tewkesbury, has just had an obituary window placed in this church, to the memory of a youthful son who died many years ago. It depicts the incident of Christ blessing little children, and forms an ornament to the chancel, which has lately been improved. It is the work of Messrs. Heaton & Co., of London. In addition to this, Mrs. Laing is also causing the other windows of the church, seven in number, which were of the usual common glass, to be refilled with thick tinted glass with coloured borders.

Uffington Church.—A memorial window has just been placed in the parish church of Uffington. The window, executed by Mr. Gibbs, of London, consists of three lancet lights, and the subject is, in the centre the Crucifixion, and on either side a type of the Crucifixion: Moses lifting up the serpent in the wilderness on one side, and Abraham offering up his son Isaac on the other.

St. Michael and All Angels', Neepsend (*Sheffield*).—The east window of this church has just been filled with stained and painted glass. The style is of the Late Decorated period of architecture, of five principal openings, with geometrical tracery. In the centre light of the tracery is the figure of St. Michael, with the subdued dragon at his feet. The surrounding openings are filled in with ornamental lights of a mosaic design of deep colours. In the five lower openings is represented the scene of the crucifixion of our Saviour, and its attending incidents, which extend over the entire breadth of the window. The figures are about 3 ft. in height. Each opening is surmounted with canopies of rich tabernacle work, with an arcade base across the window. Further colour is given to the design by a trefoil foliage border, enclosing each of the five lower openings. The window is the gift of the Rev. Thomas Wilkins. It was executed by Messrs. Bailie & Mayer, of London.

St. Bartholomew's, Dublin.—The three eastern windows of the chancel of this church have just been fitted with stained glass by Mr. O'Connor, of London. The subjects are "The Sermon on the Mount," "The Crucifixion," and "The Resurrection." The windows are a thank-offering from friends of the incumbent, for the providential escape from serious accident which the clergy and choir had when a pinnacle was blown down in the gale of December 27th, and fell into the chancel during Divine Service.

New Parish Church, Bolton.—A window in honour of Mr. Peter Ormrod, for his generosity in rebuilding the parish church, at a cost of over 30,000*l*., is to be put up in the new church. A design has been obtained from Messrs. Hardman & Co., of Birmingham, for a stained east window. The window is a seven-light one, 35 ft. high and 25 ft. wide. The artist shows a double series of groups of figures, the large ones on blue ground, and the smaller on a ruby. The subjects chosen

for the figures are from the life of St. Peter, owing to the church being dedicated to St. Peter, and also to the fact that the benefactor, Mr. Ormrod, bears that name. The cost is estimated at 800*l.*, to which there will be extras. The design has been commended, but the design of another artist who had been consulted not having been sent in, the decision on the matter has been deferred. A committee has been appointed to carry out the object.

Denton Church, near Manchester.—An easterly decorated window, consisting of three lights and tracery, has been filled with stained glass in this church. The three lights are occupied by life-size figures of our Saviour in the centre opening, and in the side lights Moses and Elias. These are surmounted by canopies and borders. The tracery is filled with sacred devices and monograms. Messrs. Edmundson & Son, of Manchester, were the artists.

Shipley Church, Yorkshire.—A painted window, consisting of three lights and tracery, has been placed in the nave of this church. The three lights are occupied by the Crucifixion, the Transfiguration, the Resurrection, and the Acts of Mercy, viz., feeding the hungry and clothing the naked, and the Good Samaritan. The upper portion of the window is filled with grisaille work, and the tracery contains angels and sacred emblems of a suitable character of design. These windows are from the establishment of Messrs. Edmundson & Son.

Books Received.

What is Matter? By an Inner Templar; author of "More Light: a Dream in Science." London: Wyman & Sons, Great Queen-street, Lincoln's Inn-fields. 1869.

THOUGH somewhat eccentric and startling in certain of its enunciations, this is a thoughtful and suggestive treatise. First of all, a brief and rapid *resumé* of ancient and modern opinions on the subject in hand, down to Faraday, is well given, in remarkably few words. The author's own theory is eclectic, but in pretty close accordance with Faraday's, so far as Faraday has treated of centres of force as the more immediate basis or subject of physical phenomena. The author thus introduces his own response to the question, "What is Matter"?

"The universe is filled with centres of force; each centre the centre of a sphere; each sphere a compound of two spheres, having the same centre, one a sphere of attraction, the other a sphere of repulsion.

* * * * *

It is by the separation of these two spheres of attraction and repulsion, and therefore by the calling forth and exercise of their powers by each, that we have the different modifications of matter."

And again,—

"The Divine Mind caused a certain immense, but yet finite, portion of space to be marked off from his immediate presence as a centre—a great sphere—of space. This, by some manifestation of His power and presence, was filled with centres of force, the seeds, as it were, of that which was to be known as matter, round each of which two forces, attraction and repulsion, were in abeyance."

This "abeyance," from balancement of attractive and repulsive force, appears to be the author's explanation of the ether stipulated for by various physical philosophers as a medium filling space, and which the Inner Templar accepts, in his own way, as the original or "prime matter." Professor Huxley's idea of "inert matter" in general is said to be that it consists of a balancement of attractive and repulsive forces. The words "attractive" and "attraction" imply an incomprehensible act, however, which is hypothetical, and which, Professor de Morgan jocularly predicts, will, by future theorists, be called "the pulley-hauley system."

In order to avoid all hypothesis on this subject, we have ourselves long used the words "concentrative" and "concentration," which are simply declarative of the universal fact or phenomenon, without involving either the "pulley-hauley system" or any other. And as the antithesis of concentrative, of course, we have preferred to use the word "radiative" rather than "repulsive." Using our own terms, then, we would suggest both to Professor Huxley and to the Inner Templar whether they ought not to modify their definitions of what matter is, by the consideration that, in ethereal or other "radiant matter," instead of the radiative and concentrative forces being in a state of balancement, the radiative is plus, the concentrative minus; while in more tangible and resistive forms of what is called gross matter, the concentrative is *plus*, the radiative *minus*. Thus, too, the way out of matter into spirit may simply be the way out of concentrative into radiative states,—a possibility which involves the radiative infinity whence the grosser forms of matter-proper may be said to have descended into concentrative unity. If concentrated matter can be infinitely radiated (as it may well be in the infinitive, whence it emanated), what can matter radiated to a certain extent be but spirit? This we may more readily allow, since we find even sceptics ceasing to regard matter as that lifeless, dead, inert, and brute mass which it once was conceived to be. As a congeries of living and associated forces, concentrative and radiative, emanating together from central points of space, the "inert substratum," or, in truth, substructure merely, heretofore called "matter," on which all material forms, bodies, or superstructures, were supposed to be based, is knocked from beneath our feet, and all that remain are living forces, concentrative and radiative, emanating from central points, *through which*, as it were, we have a direct glimpse of the Unitive and Infinitive meta-physical Power on which all physical creation is based, whence it all emanates, and by which it is all and ever sustained.

The Creator is a Sphere whose centre, said Coleridge, is everywhere and whose circumference is nowhere. Here we have a beautiful and true definition of that Unitive and Infinitive Principle, who creates all centres of force, by whom all things subsist, and "in whom we live, move, and have our being." Though beyond all, He is in and through all, and perpetually sustains all. And as for the "infinitely divisible" *matter*, with which materialists used to dabble, it is easy to see that IT *is a bottomless pit* where there is finally *nothing* to stand upon; and though, as they would insist, our forces must inhere in a subject, it is clear that they have in matter no such subject, no such basis; and therefore we must seek elsewhere for it; nor need we waste much time in the search; for concentrative force clearly emanates from and is based upon Unitive Power or Principle, and radiative force from and upon Infinitive; so that the Unitive and Infinitive Principle which transcends all physics—all creation, is the Substance or Basis of all, as well as the Creator and Disposer of all.

The accordance of the idea of Faraday, Huxley, or the Inner Templar,—that every body in existence is based upon forces emanating from (unitive) points or centres,—with the nature of the mind of man, which has been shown, in the *Builder* (of July 11th, 1863,) to be an estimater of forces and their relations, and itself based on forces, affords an additional reason for looking with favour upon such an idea; but we cannot here enter further on this subject, and must therefore briefly wind up our notice of the Inner Templar's response to the question, "What is Matter?"*

Basing it on his idea of matter, the author gives a version of the nebular theory, and also proposes a new theory of light, which we have not time at present to look into, but which seems to contain some rather curious and startling propositions, one of these involving the exact measurement of an atom or primitive sphere of force in various substances, such as air, water, and glass. On these and other points the author considers that he has "given the key which will unlock many mysteries in the world of philosophy and science;" and whatever the reader of his book may think on this point, he will find a good deal in it to ponder on, with nothing to weary the attention in the shape of prosy or prolix disquisition.

Miscellanea.

The Tower Subway.—This work has now passed the nearest approach to the bed of the river, the top of the tunnel being 23 ft. below the bed, and the engineer, Mr. Peter W. Barlow, jun., reports that at the present rate of progress the tunnel will reach high-water mark on the Surrey side in ten weeks. The ground, it is said, is so dry that the New River Company's water laid on the works has to be taken from the shafts for the cement used in the tunnel. Air is supplied to the men by a steam-engine at the shafts. Communication between the men at the face of the works and the top of the shafts is effected by an electric telegraph.

Slate Quarrying in Wales.—Seventy-five years ago slate quarrying in Wales was confined to out-of-the-way corners, where a few slates and slabs were got by the owners of the ground for their own use. As far back as the last decade of the last century, however, the Penrhyn quarry began to be looked on as a profitable investment for capital, and the true value of slates as articles of commerce began to be felt. The want of roads or other efficient means of transport to the sea, greatly retarded the development of the new industry. All the slates and slabs were at first, perforce, carried six miles to port on the backs of ponies. Subsequently, a road was made, and carts and wagons were used; and at last came the tramway. Later on, the great Llanberis quarry was opened; and, later still, the quarries of Nantlle, Festiniog, and Corris. The fact that money was to be made by quarrying and selling slates soon attracted attention; and within the last half-century not fewer than 100 quarries have been opened in different parts of Wales, either by private enterprise or by public companies, but of these not half the number is now in operation, while the number of those worked to a profit is probably under twenty. Within an arc of six miles radius, described from Port Madoc as a centre, more than 250,000*l.* have been spent without the prospect of a return. Why this has been the case it is almost beyond our province to inquire. The incompetence of directors and managers has been one principal cause of the financial ruin of more than one company. The great error committed seems to have consisted in opening quarries in districts where the slate formation is naturally bad in a commercial sense. There are only three veins of absolutely pure, laminated, and lasting slate rock as yet known to exist in North Wales.—*The Engineer.*

Technical Education.—A conference on technical education has taken place in the theatre of the School of Mines, Jermyn-street, under the presidency of Lord Elcho. Several representative working men and others interested in the question were present. The chairman, in his opening address, said it was absolutely necessary that we should have something in the way of technical education, if our manufacturers and artisans were to hold their own in the face of foreign competition. Papers dealing with the question were read by Mr. Buckmaster and others, and several resolutions were subsequently introduced. The movers proposed, in effect, that the Workmen's Technical Education Committee should be a permanent organisation, under the name of "The Workmen's Technical School Union;" that the necessity for providing technical education for their workmen and apprentices should be urged upon the great employers of labour; that the trade societies be recommended to establish schools, night-classes, museums, and libraries for the apprentices in their respective industries; and that all corporate bodies, like the guilds of the City of London, be asked to apply a portion of their funds to a similar purpose; that the Government be urged to establish a certain number of superior schools of arts and trades, similar to those in France, for the education of foremen and other high-class workmen; that application be made for the establishment of chairs for instruction in the evening, precisely similar to that given in the daytime at the School of Mines, and that provision be made in the primary schools for instruction in the elements of science and art.

Palestine Exploration Fund.—The annual meeting of this Fund has been held in Willis's Rooms, the Archbishop of York in the chair. Among those present were Mr. Tite, M.P., Professor Owen, Mr. Macgregor of the Rob Roy, and various other well-known persons. Mr. Grove, the hon. sec., read the report of the executive committee, and Mr. Morrison read the treasurer's report, from which it appears that the number of annual subscribers was doubled during the past year, which we are glad to think denotes increasing interest in the very important explorations at Jerusalem. We hope the list will again be doubled during the present year. A resolution was agreed to approving of the operations and desiring their continuance.

The French Duty on English Plate Glass.—A deputation of English plate-glass manufacturers has had an interview with Mr. Bright at the office of the Board of Trade, to present a memorial praying for a remission of the duty now imposed on English plate-glass by the French Government.

* In connexion with the whole subject we may here refer to an article in the *Builder* of 1854, p. 580, titled, "What is Electricity?" and to a "Psychological Key," by J. E. Dove, in the *Builder* of July 11th, 1863.

Enclosure of Commons.—The quantity of land which has been enclosed in England and Wales, or is in process of being enclosed, since the passing of the Enclosure Act of 1845, amounts to 614,804 acres; out of this quantity 1,742 acres were reserved for the purposes of exercise and recreation, and 2,223 acres reserved as allotments for the labouring poor. Wandsworth Common possessed over 800 acres of pasturage, which was used for common rights; but by the Enclosures Act nearly the whole of this has been taken for the erection of public institutions, the county prison, and railway cuttings, and the rights are reduced to within 100 acres. Now we are told that twenty acres more of the common are about to be taken by a parochial board for the erection of pauper buildings.

Improved Cabs.—The Council of the Society of Arts have offered the following medals for improved hackney carriages specially suited to the metropolis:—The Society's Gold Medal for the best and most convenient open hackney carriage for two persons; the Society's Silver Medal for the second-best ditto; the Society's Gold Medal for the best and most convenient closed hackney carriage for two persons; the Society's Silver Medal for the second-best ditto; the Society's Gold Medal for the best and most convenient closed hackney carriage for four persons; the Society's Silver Medal for the second-best ditto. Lightness of construction, combined with adequate strength and durability, will be especially considered in making the awards.

Well-sinking in Algeria.—A curious circumstance is announced from Algeria. A well lately sunk at Ain Sala to the depth of forty-four mètres, threw up not only a large body of water, but, to the surprise of the engineers, an innumerable quantity of small fish. These are described as being on an average half an inch long, and resembling whitebait both in appearance and taste. From the fact of the sand extracted from these wells being identical with that which forms the bed of the Nile, it is concluded that an underground communication must exist between them and that river.

Leicestershire Architectural and Archæological Society.—The annual summer gathering of this society was held at Melton Mowbray, with an excursion to Bottesford and several other places on the way. A day's diggings at Melton, upon ground where Anglo-Saxon relics have been found, preceded the excursions. A public meeting took place in the Corn Exchange, the vicar of Melton in the chair, when Mr. James Thompson read a paper on the objects of Architectural and Archæological Societies, and the Rev. Assheton Pownall one on Early English Money. Mr. North also read a paper on the Ancient Schools of Melton. On the following day the excursion took place, when a party of about thirty proceeded in vehicles to visit the principal churches and objects of interest in a district extending to the extreme north-east of the county. Mr. M. H. Bloxam and Mr. T. North were amongst them.

The Workmen's International Exhibition, 1870.—A public meeting promotive of this exhibition has been held at the Pimlico Rooms, Winchester-street, Pimlico, when a deputation from the council explained the details and arrangements. The exhibition will be held in the Agricultural Hall, Islington. It is to serve, *inter alia*, as a school of technical education. All articles exhibited will be signed with the name of the workmen by whom they were made. Where division of labour prevails, workmen are invited to exhibit specimens of that particular part of the work in which they are severally engaged, (such as in a piano or a watch, and to combine for the production of the completed article. Medals and certificates of merit will be given, and also, in special cases, money prizes. Articles may be sold, but not removed, during the exhibition.

Annual Poor-Rate Return.—The return for the year ending at Lady-day, 1868, shows that the gross estimated rental of the property in England and Wales assessed to the Poor-rate in the year was returned as 118,334,081*l.*, the rateable annual value 100,612,734*l.* The amount levied as poor-rates was 11,054,513*l.*, being 1s. 10·4d. in the pound on the gross estimated rental, 2s. 2·4d. on the net annual value. These ratios are larger than in the preceding year by 1·5d. and 1·9d. respectively. The total amount of local taxation was 16,660,459*l.*

Gas-Burners.—Too little attention has heretofore been paid to the subject of gas-burners, many of which are wasteful, while some others are far more economical. The referees appointed under the City of London Gas Act, 1868, in their report to the Board of Trade of the 3rd May, 1869, point attention to this subject, and state that they have found Leoni's standard Adamas, Albert Crutch, and Economiser, to be far more economical than others they have tested. The referees think it a matter of urgent importance that such facts as those they state should be brought to the knowledge of the public.

The Proposed Building at Southwark Park.—An out-door meeting has been held in Southwark, to protest against the proposition to build on a part of the ground purchased with the view of making a park for Southwark. The Metropolitan Board purchased 63 acres, their purpose being to aid the ratepayers in defraying the cost by devoting 16 acres to building purposes, without which purpose, doubtless, no park would have been purchased at all; and the only fear, we should think, may be that the movement against the purposed arrangement may prevent the Board from purchasing open ground for parks in other parts of the metropolis. The meeting referred to resolved to send a deputation to the Board on the subject.

Farewell Breakfast to Artisan Emigrants.—At the Cannon-street Hotel, an interesting breakfast party has been held, to bid God-speed after the old Christian fashion to a party of fourteen British operatives, who, with wives and children, were about to leave this country for the United States of America, to be employed there on the new buildings of the Cornell University, at Ithaca, to which Mr. Goldwin Smith has been attached. These fourteen skilled workmen have been picked and chosen from the Associated Trades, through the agency, we believe, of Mr. George Howell, and under the auspices of the Hon. Auberon Herbert and Mr. Hodgson Pratt, by whom the invitations to this friendly little gathering were sent. Lord Houghton presided. After Lord Houghton, Mr. Applegarth, Dr. Watts (of Manchester), the Hon. G. Brodrick, Mr. George Howell, Mr. Hodgson Pratt, Lord Edward Fitzmaurice, Mr. Morier, and Mr. Cremer, were the speakers, as also was Mr. Sneath, a carpenter, one of the emigrants.

Electro Telegraphic Progress.—The French Atlantic cable which is being laid showed a slight defect in the electrical condition on Friday night. The gutta-percha resistance fell, and there was every indication of a fault which it was impossible to localise. On Saturday morning, however, the communication was again perfect, and telegrams between the ship and the shore were freely passed. The fault reported was considered to be evidently very minute, and in no way affecting the practical working of the cable. Since then a telegram has announced the cutting and buoying of the cable, but whether in shoal water, or previous to reaching it, was not said; nor was any reason given.——It is stated that the sum agreed upon by the Electric Telegraph Company, as the price of their property, is 2,938,000*l.* The plant is valued at 1,000,000*l.*, and the net profits of 180,000*l.* will realise above 6 per cent. upon the sum the Government will pay.——In the House of Commons, in reply to questions, the Postmaster-General stated that the negotiations with the telegraph companies for the acquisition of the telegraphs were now completed, but those with the railway companies were not yet quite finished; these last, however, were in such a state as to enable the Government to ascertain very nearly the sum required for the acquisition of the whole of the telegraphs of the country, and a Bill would shortly be introduced for the purpose of raising the necessary funds. A clause would be introduced giving to the Government a monopoly of the transmission of telegraphic messages, in the same way that they have a monopoly of the transmission of letters.

British Museum.—A large and beautifully-carved vase (or, as the museum authorities prefer to label it, a "krater") found in the villa of Hadrian, Palestrina, has just been erected in the middle of the area of the entrance-hall. It is a very rich piece of ancient work, the bowl being supported on bold claw trusses with lions' heads. Round the upper part satyrs are carved, represented in the act of making wine. The whole erection stands about 10 ft. from the floor.

A Tribute to Mr. Applegarth.—A demonstration in honour of Mr. Robert Applegarth, secretary of the Amalgamated Society of Carpenters and Joiners, has been held at Chorlton-on-Medlock. Mr. Applegarth was presented with a book-case and 200 volumes of works, selected by Mr. Hughes, M.P., and other gentlemen, and towards which contributions were received from Mr. Rupert Kettle, Mr. Mundella, M.P., Mr. Vernon Lushington, Mr. Crompton, the late Mr. Ernest Jones, Professor Beesly, of the London University, Professor Jevons, of Owen's College, Mr. J. M. Ludlow, Mr. Lloyd Jones, and others. The testimonial was got up not merely as a reward for duty, but as a stamp of approval of Mr. Applegarth's public conduct.

Well-opening at Edlaston and Wyaston. The inhabitants of Edlaston and Wyaston have for generations suffered from the want of fresh water, particularly in the drought of 1868, but that necessity has been at length supplied by the liberality of Mrs. Alderson, of Wyaston Grove. A well has been sunk and a pump put down for the free use of the parishioners, over which has been erected a stone building. The presentation of the well took place on Wednesday, the 16th ult., when the inhabitants in gratitude made a public demonstration, and with the proceeds of a subscription from workmen's wives, presented Mrs. Alderson with a glass jug and two goblets.

The Royal Horticultural Society.—The president and fellows of this society have presented an interesting entertainment to a numerous and distinguished company. In addition to a *soirée*, several incidents occurred which are not generally included in the programme of this class of social gatherings. Prince Teck was present, and a long line of gas jets lighted up the bright combinations of colour effected by the movements of the company through the hall, and the statuary was thrown into bold relief by the sombre background of exotics. The members of the St. Cecilia Choral Society performed a selection of glees and part songs, all, except one, the compositions of English masters. Whippert's band agreeably alternated with the singing, and the visitors continued to move through the conservatory and the avenues of promenade in its vicinity until nearly midnight.

Society of Arts.—The 115th annual meeting of the members of the Society for the Encouragement of Arts was held on Wednesday, at the offices of the society, Lord Henry Lennox in the chair. Mr. Le Neve Foster, the secretary, read a lengthy report detailing the operations of the society during the past year, which had been of the most varied description. The Albert Medal for rewarding distinguished merit in promoting art, manufactures, or commerce, had this year been awarded to Baron Liebig. The Swiney Prize had been given to Dr. Guy. Prizes for art-workmanship to the amount of 95*l.* had been given. Three courses of Cantor lectures had been delivered by Mr. W. Perkins, Mr. S. Hart, and Mr. J. Henderson.

Addition to the Earlswood Asylum for Idiots.—The Prince of Wales has laid the foundation-stone of an addition to this asylum. The additions proposed comprise an extension of the dining-hall to nearly double its present length, with enlarged space for playing and recreation, new kitchen, scullery, bakehouse, wardrobes, workrooms, lavatories, baths, &c. The estimated cost of these is 12,000*l.*, but it is also intended to erect a detached infirmary whenever the Board shall find that they have sufficient funds in hand to justify the necessary outlay.

The New Fish Market, Swansea.—This much required accommodation, erected by the corporation at an expense of something like 500*l.*, has been opened. It is erected over the butchers' stalls on the south side of the market, near the Orange-street entrance. Means have been adopted to secure ventilation, and marble troughs have been erected for the display of fish; whilst there is an abundant supply of water.

Gas-pipes of Wood.—A firm in Oshkosh, Wisconsin (U. S.), has contracted to make 1,000,000 ft. of wooden tubes to lay down in that city for gas-pipes. They are to be made of timber 6 in. square, bored in the same way as pump-barrels. For the backwoods of America wooden gas-pipes may be all very well; but where metals abound such pipes are not to be commended. The Chinese cane gas-pipes, even, would be better than these.

Value of a House in Cheapside.—The freehold premises in Cheapside occupied by Mr. John Bennett, the watch and clock maker, have been put up at auction. The auctioneer stated that the property covered an area of 1,750 square feet, which, if in possession, he should value at 15*l.* per square foot; but Mr. Bennett held a lease of the premises for about 11 years at 500*l.* per annum, for which he paid a large premium in addition to making considerable alterations; and if the premises were now in hand he should estimate them to be worth at least 1,000*l.* a year. The biddings commenced at 10,000*l.*, and after competition the property was bought in, we believe, at 14,000*l.*

The New Law Courts.—A report has been issued by the committee appointed by the Courts of Justice Commission "to examine all the plans submitted to the Commission, with a view to ascertain the dimensions and measurements." The total area of office accommodation in the Parliament scheme is 256,821 superficial feet; the area provided in Mr. Street's Howard-street scheme is 180,423 ft.; that in Mr. Street's reduced scheme for Carey-street site, as just published by the Office of Works, 278,395 ft.; and under the scheme approved by the Commission reduced to the Carey-street site, 284,188 ft. This information is supplemented by the report from the surveyor of Her Majesty's Works and Public Buildings to the First Commissioner on the sites proposed for the courts and offices of law. He concludes in favour of the Embankment site.

Convalescent Hospital for Children.—The Mansion at Highgate known as Cromwell House, and believed to have been built by Cromwell for his daughter, and her husband, General Ireton, has been converted into a convalescent hospital for children by the managers of the children's hospital in Great Ormond-street. The rooms for dormitories and day-rooms are spacious and lofty, and there are an extensive playground and garden, with a large kitchen-garden. There are also bath-rooms, lavatories, and other modern appliances. When fully occupied, the house will receive about 100 patients. At the outset 50 children will be received. The works of alteration and adaptation have been carried out at an outlay of about 3,000*l.*, by Messrs. Wagstaff & Son, under the direction of Mr. Arntz. The baths and hot-water apparatus, with all the fittings in the kitchen department, are the work of Messrs. Benham & Son. Other parts of the work have been carried out by Messrs. Jennings.

The South Kensington Museum.—In reply to Lord Elcho in the Commons, the Vice-President of the Committee of Council on Education said the reason why the brick and terra cotta buildings of the South Kensington Museum in Exhibition-road were not progressing for the last three months, was simply that it was thought necessary to reduce the building vote, which was 8,500*l.* for this year, and there were other works the completion of which was more urgently called for.

Working Men's Club and Institute Union.—On the 28th ult., a conference of persons interested in working men's clubs and institutes was held in the theatre of the Society of Arts, at eleven o'clock a.m. After the conference, the representatives of clubs in the country dined with members of the London institutions at the Artisans' Club in Newman-street. After the dinner a paper was read on "Art applied to Industry," by Mr. C. Lamport. On the following day (Tuesday), the 29th ult., the annual meeting of the union took place at Exeter Hall.

Public Parks (Ireland) Bill.—Viscount Lifford, in the House of Lords, said the object of this bill, which came up from the House of Commons, was to assimilate the law of Ireland with respect to the creation of public parks to that of England. The bill gave power to the commissioners of towns with a population of 10,000 or over, to levy rates for the purpose of forming local parks. The bill was read a second time.

Payment of Board of Health Surveyors. During a recent discussion concerning advertising for a new surveyor to the Local Board of Cockermouth, one of the members of the Board, Dr. Dodgson, said justly that it was a strange thing that they should give the engineman 57*l.* a year and a free cottage to live in, while they were offering to a man who would have to look after the engineman the sum of 50*l.* per year.

The Value of Land in Brighton.—The surplus land which had been acquired by the corporation for improving the lower part of North-road, was recently submitted to public competition. Amongst the portions sold we may note Lot 6, at the corner of Jubilee-street, having a frontage of 18 ft. 6 in. to North-road, and of 35 ft. 8 in. to Jubilee-street, by Mr. A. Buckwell, for 295*l.*; Lot 7, to the west of this, having a frontage to North-road of 17 ft. 4 in., by Mr. W. Wilson, for 200*l.*; Lot 10, at the upper corner of Regent-street, to which it has a frontage of 45 ft. 4 in., and a frontage to North-road of 17 ft. 6 in., by Mr. Corney, for 310*l.*; Lot 11, to the west of this, a frontage to North-road, 16 ft., by Mr. W. Wilson, for 220*l.*; Lot 12, again to the west, a frontage of 20 ft, by Mr. H. Verrall, for 250*l.*; Lot 13, again to the west, a frontage of 16 ft., by Mr. H. Dash, for 260*l.*; and Lot 14, at the corner of Gardener-street, to which it has a frontage of 39 ft. 4 in., and to North-road of 16 ft. 6 in., by Mr. Oliver Weston, for 610*l.*

The Projected Channel Tunnel.—A deputation, consisting of Lord Richard Grosvenor, Admiral Elliot, Mr. Hawkshaw, C.E, and others, has had an interview with the Right Hon. J. Bright, at the office of the Board of Trade, on the subject of the proposed Channel tunnel from England to France.

Public Works in Greece.—An announcement of much interest was made in the King of Greece's speech at the opening of the new Chamber of Deputies. Amongst various other public works which will be speedily commenced, a canal is to be cut through the Isthmus of Corinth. This undertaking is at last to be realized, with the help, we believe, of M. de Lesseps. The famous Peloponnesus will then become an island.

Rats and Mice.—A recent writer says that cotton saturated with chloroform, and then stuffed in the holes of rats and mice, will prevent their re-appearance in a house. Tar is said to be a capital thing to pour into their holes, and might be largely used in conjunction with broken bottles and cement for filling up the places they have undermined and infest. In the bottles and cement alone not much faith is to be put.

Heat by Compression.—Every one knows that, if a certain volume of air be compressed, the temperature is raised in certain proportions. Acting on this fact, Mr. Bessemer has devised a plan for increasing immensely the heat of furnaces by condensing the gases.

Congress of the British Archæological Association.—The congress of this association will this year be held in St. Alban's, commencing August 2nd, and ending on the 7th. Lord Lytton is the president, and the arrangements are making satisfactory progress.

Kent Archæological Society.—It has been resolved that the general meeting of this society shall take place at West Malling on Thursday and Friday, the 5th and 6th of August.

Chelmsford.—The Chelmsford Highway Board, at their last meeting, passed a resolution increasing the clerk's salary 20*l.* A short time since they increased the salary of their district surveyor, Mr. Frank Whitmore, from 200*l.* to 250*l.* a year.

Royal Archæological Institute.—The Royal Archæological Institute of Great Britain and Ireland will visit Bury St. Edmunds on the 29th inst.

New Process for Preserving Wood.—A new process for preserving wood by means of borax is announced. The wood, it is said, can be made impermeable to water by dissolving some shellac in the solution of borax.

Schools of Art Works.—We are glad to hear that the large metal flagon, designed, modelled, and chased by Mr. H. Archer, and for which the gold medal was awarded, has been bought by an eminent firm in Sheffield.

TENDERS.

For erecting warehouse, Speck's-fields, Mile-end New Town, for Mr. A. Bishop. Mr. J. Tanner, architect:—

Marr	2,256 0 0
Ashby & Sons	1,992 0 0
Eaton & Chapman	1,940 0 0
Turner & Sons	1,899 0 0
Ashby & Horner (accepted)	1,880 0 0

For completing fire brigade station, Renfrew-road, Lower Kennington-lane, for the Metropolitan Board of Works:—

Cook & Green	£871 0 0
Ebb	844 0 0
Till	835 0 0
Crockett	796 0 0
Waterson	765 0 0
Blackmore & Morley	755 0 0
Shurmur	694 0 0
Ball	657 0 0
Winship	615 0 0

For St. Anne's Church, Bermondsey. Mr. A. Porter, architect. Quantities supplied:—

Coleman	£3,275 0 0
Dove, Brothers	3,255 0 0
Hart	3,250 0 0
Merritt & Ashby	3,200 0 0
Myers & Son	3,159 0 0
Kelly, Brothers	3,027 0 0
Nixon	2,998 0 0
Webb & Sons	2,974 0 0
Browne & Robinson	2,890 0 0

For rebuilding house, Westminster, for Mr. Parks. Mr. H. W. Budd, architect:—

Hoare & Postlethwaite	£567 0 0
King & Son	565 0 0
Richards	518 0 0
Foster	510 0 0

For the erection of twelve cottages, at New Swindon, for Mr. William Read. Mr. T. S. Lansdown, architect:—

Harrison & Son	£2,432 0 0
Bridges	2,299 0 0
Drew	2,268 0 0
Nightingale (too late)	2,134 0 0
Kimberly	2,080 0 0
Newcombe	2,040 0 0
Lovett	1,969 0 0
Dover	1,900 0 0
Haynes	1,880 0 0
Foreshaw (accepted)	1,878 0 0
Briggs	1,794 14 0
Barrett (withdrawn)	1,770 10 0
Wiltshire (withdrawn)	1,767 7 11

For school and class room and teacher's residence, Bredgar, Kent. Mr. G. Ruck, architect. Quantities supplied:—

Gammon	£983 15 0
Sollitt	979 0 0
Harris	970 0 0
Anscomb	965 0 0
Tidy	955 0 0
Clements	935 0 0
Saywell	933 0 0
Wallis & Clements	883 0 0
Seager & Marley	859 0 0
Epps (accepted)	747 10 0

For brewery and dwelling-house, at Wootton Bassett, for Mr. S. Hart. Mr. T. S. Lansdown, architect:—

Barnicoat	£2,480 0 0
Kimberly	2,286 0 0
Newcombe	2,265 0 0
Wheeler	2,227 0 0
Dover	2,115 0 0
Jones	2,100 0 0
Drew	2,044 0 0
Barrett	1,930 2 4
Dyer (accepted)	1,920 0 0

For reseating, refronting, &c. Congregational Chapel, in Fish-street, Hull. Mr. S. Musgrave, architect:—

Bricklayer's and Plasterer's Work.

Musgrave	£400 0 0

Carpenter's and Joiner's Work.

Sissons	£660 0 0

Mason's Work.

Sweeting	£35 0 0

Plumber's Work.

Richardson	£21 0 0

Gasfitter's Work.

Stones	£36 0 0

Slater's Work.

Wilde & Co.	£9 16 0

Painter's Work.

Chapman	£50 0 0

For erecting Sandown townhall, Isle of Wight. Mr. T. Dowell, architect:—

Coaker	£1,600 0 0
Newman	1,469 0 0
Parson & Co.	1,424 0 0
Lowe	1,418 0 0
Young	1,380 0 0
Hayden	1,327 10 0
Urey	1,327 0 0
Flux	1,287 0 0
Jolliffe	1,286 0 0
Thomas (accepted)	1,278 0 0

For alterations and enlargement of the Horse and Dorsers, Bread-street-hill, Cannon-street, for Mr. T. Brinn. Drawings prepared by Mr. P. Arthur:—

Builder's Work.

Messrs. Michell	£396 0 0

Plumber's Work.

Messrs. Clements	—

Painter's and Decorator's Work.

McCarthy	—

For rebuilding house and premises, No. 13, Elizabeth-street, Pimlico. Mr. J. M. Dance:—

Wilson	£561 0 0
Leggett	533 10 0
Whittick (accepted)	526 0 0